STRATEGIC CONSIDERATIONS FOR A NEW BRITISH COLUMBIA ENERGY POLICY

FINAL REPORT OF THE TASK FORCE ON ENERGY POLICY

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EXECUTIVE SUMMARY

Given the importance of energy security and reliability to economic growth, British Columbia's energy sector must be developed. There are more energy development opportunities in the province today than ever before. In addition to its assets in hydroelectric development on the Peace and Columbia Rivers, the province now has a growing natural gas sector, a number of alternative energy sources and large deposits of coal. With innovation in conservation and efficiency, British Columbia has the talent and technology to expand its energy sector. This development must occur now.

At the same time, British Columbia faces some new challenges. Energy infrastructure is aging and requires both upgrading and development. This will require substantial financial investment. Governments today are under increasing financial constraints. The trend is to encourage private investors to meet provincial investment needs and take project risks. In addition, environmental priorities mean that economic and environmental interests must be balanced.

There is a new North American reality in which consumers, including British Columbians, are demanding more – not less energy. The average household, with its appliances and computers, is much more reliant on energy today than it was four decades ago when hydroelectric power was developed on the Peace and Columbia Rivers and natural gas was developed in BC's Northeast. Consumers want secure and reliable energy that is competitively priced. They want innovation in energy applications and greater customer choice. They also want an energy product that is environmentally friendly, particularly given the growing concerns over climate change and air quality.

There is also greater energy interdependence in North America. For example, British Columbia's natural gas is a major source for the growing energy demand in the US Pacific Northwest. At the same time, the province trades electricity with Alberta and Washington State on a regular basis. British Columbia is now increasingly dependent on net imports to meet its demand.

One of the key conclusions of the Task Force is that British Columbia needs new electricity sources. While the province does not face an immediate crisis, it takes time to plan, permit and construct energy projects. Inactivity and subsequent delays in developing new sources of supply will certainly lead to a critical situation well before the end of the decade. Given the important role of electricity in every household and business in British Columbia today, the supply issue must be addressed now

British Columbia has one realistic choice to consider in responding to its energy challenges: new supply must be developed and conservation and efficiency must be enhanced.

British Columbia must move aggressively on energy development. Finding the appropriate balance between encouraging conservation and new resources of electricity supply, including alternative energy sources, requires a competitive wholesale market and a pricing structure that is market-based. In addition, separate and independent electricity ransmission is required, which in turn necessitates a restructuring of BC Hydro.

t is the Task Force's view that energy development is not only prudent but essential. Otherwise the province faces a greater reliance on electricity imports and more volatile prices, as experienced in Alberta and California. In addition, British Columbia would lose the employment and ncome benefits of energy development.

Most of the people who wrote or spoke to the Task Force supported energy development. British Columbians want and deserve a vibrant energy sector. With it, come security, eliability and diversity of supply, competitive prices, an appropriate balance between economic and environmental priorities and gains in employment and income.

While the province needs more energy for domestic use, energy exports can also provide employment and income benefits for British Columbians. The success of British Columbia's energy sector will depend on private investors and individual consumers. Both must be encouraged to participate – the ormer through the development of open and competitive markets and the latter in response o price signals on energy cost and choice.

STRATEGIC DIRECTIONS

Therefore, to guide the Province and position British Columbia to take advantage of its energy potential, the Task Force recommends nine strategic directions, as follows:

- develop the energy sector;
- diversify energy supplies and encourage conservation and efficiency;
- provide a competitive market environment;
- restructure the electricity sector;
- expand energy infrastructure;
- make sound environmental decisions;
- harmonize government regulations;
- encourage research and consumer education; and
- involve communities and First Nations.

The Final Report provides a forward-looking set of recommendations for a new energy policy for British Columbia. However, these recommendations have not been considered in isolation. They also reflect that British Columbia operates in a regional market, one that crosses provincial as well as international boundaries.

In preparing its Final Report, the Task Force also became aware of several conflicting and interrelated issues with major policy implications for the future of energy development in British Columbia.

One issue is the growing desire in Canada and around the world to reduce greenhouse-gas emissions from fossil fuels and mitigate climate change. Regardless of the current debate about the economic costs of implementing the Kyoto Protocol, public concern over greenhouse-gas emissions will continue to influence the course of energy development and policy in Canada.

If the use of fossil fuels is constrained, other sources of energy supply will be required. These requirements could be filled by alternative and renewable forms of energy, specifically hydroelectric power. These energy sources, however, also raise environmental concerns including the impact on fish and their habitat. If the implications for the environment and energy supply are to be properly addressed, federal/provincial coordination becomes paramount.

Yet another issue is the federal government's position on energy exports to the United States. Last fall the British Columbia Premier joined the Prime Minister and other Western Premiers in a trade mission to promote the sale of Canadian energy to the United States. As well, the federal government has indicated it will support initiatives arising from the recent US Energy Policy Report. Therefore, Canada may be expected to increase its conventional energy exports.

The land claims of First Nations present concerns that must also be addressed, because they create uncertainty over access to energy resources. Once again, this issue requires leadership from the federal government and collaborative federal/provincial action.

Clearly, the common thread connecting each of these issues is the federal government and how some of its interrelated, but conflicting policies create uncertainty for future energy development across this country, particularly in Western Canada. If British Columbia's future energy needs and environmental concerns are both to be met, the Canada-British Columbia Agreement for Environmental Assessment Cooperation must be renewed and strengthened, recognizing that energy development depends on timely decisions.

In summary, the Final Report of the Task Force contains suggestions and recommendations on how best to develop a vibrant energy sector in British Columbia. It provides an overall set of policy recommendations for government's consideration. Its recommendations were informed by the thoughtful comments and suggestions of many individuals and organizations interested in the future of this great province. If the past can serve as a guide, a new energy policy can become the equivalent of the two-river policy of the late twentieth century.

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CHAPTER • 1

INTRODUCTION AND PURPOSE

British Columbia is blessed with an abundance of natural energy resources. Available, reliable and competitively priced energy is fundamental to the province's economy. The energy sector contributes to British Columbia's export revenue and strengthens the international competitiveness of industry in the province. The sector provides thousands of jobs and, through royalties and tax revenues to government, supports the quality of life of all British Columbians.

British Columbia now faces a rapidly changing energy future. All of the province's energy resources may ultimately prove inadequate if we do not manage them appropriately now. Future generations in North America will demand greater choice of energy supply, with an increasing preference for sources that are competitively priced and environmentally sound. If we can meet these challenges, we will be rewarded with energy security at home, reduced environmental impacts and expanding economic and employment benefits. Conversely, if we are unprepared for change, such rewards will be unattainable.

This Final Report is intended to guide the Province in making the wisest energy decisions to ensure consumer choice and protection for British Columbians, now and in the future.

TASK FORCE ON ENERGY POLICY

In August 2001, the Premier of British Columbia, the Honourable Gordon Campbell, established a Task Force to develop recommendations on an energy policy for British Columbia (see Appendix 1 for the Terms of Reference). This policy is to be based on best practices worldwide, designed specifically to meet the energy needs of British Columbians and to foster energy development in the province consistent with exemplary environmental practices.

Guiding Principles

The Terms of Reference for the Task Force stipulate the following five guiding principles:

- British Columbians require a secure, reliable and environmentally sound supply of energy;
- policy is to be guided by the consistent application of market forces across all sources of energy;
- regulation should emulate market principles as much as reasonably possible;
- the current relatively low-cost electricity enjoyed by British Columbians should be treated as an entitlement (or endowment), with the Task Force to determine appropriate means of regulation, use and distribution; and
- government agencies involved in the regulation and development of energy must be efficient and accountable.

The Terms of Reference explicitly exclude offshore development, which is being addressed through another process. Also, there is no mandate to undertake a full examination of the transportation sector or a review of issues associated with climate change.

Membership

The Energy Policy Development Task Force is composed of the following members:

Jack Ebbels
Deputy Minister, BC Ministry of Energy and Mines – Chair;

J. Peter Meekison
Former Deputy Minister, Federal and Intergovernmental Affairs, Alberta;

John Bechtold
Former senior executive with Petro Canada having extensive knowledge in natural gas;

Erik Westergaard
An expert on electricity issues with extensive experience in Australia and New Zealand and now a Vancouver-based management consultant on energy; and

Brenda Eaton
Deputy Minister to the Premier of British Columbia and former Deputy Minister of Energy and Mines.

Process

After the Task Force was appointed, working groups composed of experts and practitioners were directed to examine the various energy sub-sectors, i.e., conservation, efficiency and alternative energy; electricity; oil and natural gas; and coal. An additional working group examined the regulatory framework for the energy sector as a whole (see Appendix 2 for working group representation). As part of its review, each working group addressed environmental issues specific to that sub-sector. The Task Force used the working groups' in-depth analysis to inform its broader analysis of the entire energy sector.

The Task Force released its preliminary findings in an Interim Report on December 17, 2001. Since that time, the Task Force received 155 responses to the Interim Report. Submissions received prior to and after the Interim Report are listed in Appendices 3 and 4 respectively. In addition, 35 meetings were held with stakeholders (see Appendix 5).

The Final Report of the Task Force was to be submitted to the Minister of Energy and Mines by February 15, 2002. The Minister extended the deadline to March 15, 2002, to allow the Task Force additional time to consider this public feedback.

COMMENT ON THE INTERIM REPORT

Comment on the Interim Report was an important part of the process. Some presenters felt the time available for comment was too brief, but to their credit they made the effort to share their views with the Task Force. It would be fair to state that comments received were both critical and favourable. Perhaps what is most important is that a debate on energy policy took place. With the release of the Final Report, the debate will continue.

Although the Interim Report spurred diverse opinions, certain themes were constant. Most recognized that new energy supplies are needed and that they need to be priced at market levels. There was also an acceptance of the need for alternative energy supplies.

From the submissions received and the consultations held, there was little negative comment on the restructuring of BC Hydro. There were concerns around raising the cost of electricity from many of the written submissions. Perhaps the most frequently stated concern was the treatment of the endowment. Some argued that price adjustments should be gradual and others insisted there should be no increases. For the most part, there was recognition, perhaps reluctant by some, that there is an energy problem facing British Columbia. And while not yet a crisis, it demands our attention.

STRUCTURE OF THE FINAL REPORT

The Final Report of the Energy Policy Task Force is designed to continue the Interim Report's analysis of British Columbia's energy sector, its current role, its present challenges and its opportunities (see Appendix 6 for an overview of the energy sector). The Final Report provides further guidance and recommendations to the Province on how to position British Columbia to maximize the energy sector's potential for the benefit of the people and the economy. The Task Force took efforts to present its findings and recommendations in plain language, recognizing the complexity and technical nature of the energy business.

Chapter 2 outlines the reasons why the Task Force believes change is critical for British Columbia, and Chapter 3 identifies the strategic directions considered key to bringing the province's energy policy in line with the rapidly changing twenty-first-century economy.

Chapters 4 through 7 address key sub-sectors: conservation, efficiency and alternative energy; electricity; oil and natural gas, and coal. The chapters provide a description of each sub-sector, outline the issues facing them and provide clear policy recommendations for the Province. The recommendations should not be seen in isolation but considered as an integrated whole.

Chapter 8 addresses the current regulatory framework for the energy sector, and provides recommendations to streamline and simplify its processes while ensuring consumer protection and safety. Chapter 9 provides the overall conclusions of the Task Force, and Chapter 10 contains a complete list of recommendations made throughout the Report.

Throughout the Report, topic boxes provide information on energy policies in other jurisdictions, as well as other information that may help to provide a broader understanding of the energy sector and the policy issues affecting it.

CHAPTER • 2

THE NEED FOR A NEW ENERGY POLICY FOR BRITISH COLUMBIA

INTRODUCTION

Powerful forces are shaping the energy industry worldwide, including the following:

- rising consumer demand for energy;
- a growing concern for the safety and security of energy supply;
- the growing influence of market forces;
- the globalization and liberalization of trade, leading to increased competition in world energy markets;
- the changing role of government;
- a growing awareness of the global environmental impact of fossil fuels; and
- the impact of new technologies.

> "While it is important to recognize the continental nature of the energy market. consumers must be made aware that energy consumption sustains their way of life."
>
> *Canadian Association of Petroleum Producers*

Combined with the global influences described above. the following factors have created the need for a new energy policy for British Columbia:

- we are now a net importer of electricity – new supply is needed;
- our electricity infrastructure is aging and therefore needs significant investment for upgrading;
- at the same time. we need new transmission capacity now;
- we operate in a regional energy market, one that crosses provincial as well as international boundaries;
- we need more private investment in energy
- population and technological growth increase demand for energy – this demand will accelerate with economic recovery; and

NOVA SCOTIA

Nova Scotia's new long-term plan for energy management and development is designed to maximize opportunities for the province to secure its energy future. It points the way for the people of Nova Scotia to reap the economic, employment and environmental benefits of a vibrant and growing energy industry. The plan includes the following measures:

- a new Department of Energy;
- the gradual introduction of a competitive electricity market;
- creation of the Nova Scotia Offshore Heritage Trust;
- steps to improve the environment;
- offshore utility corridors to protect the marine environment and fishing industry;
- creation of an efficient and effective regulatory environment; and
- incentives for economic growth.

- there are significant opportunities for the development and export of energy.

In addition to these factors, climate change is now one of the most prominent issues on the world stage and is poised to influence global energy policy for much of the twenty-first century. This issue adds to the need to develop BC's energy policy now.

Guided by the right policy decisions, British Columbia's energy sector can work for everyone. As additional energy supplies are brought online, consumers benefit with improved choice and competitive prices. Increasing competition – for secure resources, for new sources of energy, and for investment capital – is the hallmark of today's international energy sector.

The role of government is shifting, but it may never be more important. The transition to more competitive energy markets and the emergence of a continental market requires clarity for the roles of government and the private sector.

THE CHANGING ROLE OF GOVERNMENT

British Columbia's energy sector, and electricity in particular, has been driven in the past by wise public investments and a dominant role for government. For years, the cornerstone of British Columbia's energy policy was electricity. That policy was fitting for its time but the sector has changed dramatically in the last two decades. Today, additional sources of energy such as natural

UNITED STATES

In May 2001, the National Energy Policy Development Group released a new National Energy Policy for the United States. Its 105 recommendations focus on the need for reliable, affordable and environmentally sound energy for the future. The policy stresses the need to promote energy conservation; to repair and modernize the country's energy infrastructure; to increase supply in ways that protect and improve the environment; and to increase energy security, both for emergency situations and for low-income citizens.

The National Energy Policy is based on the following three principles:

- a long-term comprehensive strategy;
- new environmentally friendly technologies; and
- raising the living standards of the American people.

Among the recommendations is support for a North American energy framework to expand and accelerate cross-border energy investment, oil and gas pipelines and electricity grid connections.

gas are available. Further, our electricity infrastructure is aging, transmission lines are crowded, and the current system – where BC Hydro has a virtual monopoly on the sector – discourages private investment.

Government is the steward of British Columbia's energy resources on behalf of the people of the province. It is responsible for ensuring that BC has an energy policy that maximizes the benefits of these resources for British Columbians. Therefore, a successful energy policy must focus on growth, diversification, creativity and price competition, recognizing the role market forces can play.

The future success of our energy sector depends on attracting private capital to bring on new sources to meet demand and to replenish and augment our aging infrastructure. That can only be achieved by developing competitive electricity markets. New investment will help to meet the domestic energy needs of British Columbians and enhance British Columbia's energy export potential.

The time is right to do things differently. Government can create the essential environment to allow the energy sector to respond to change in a timely and efficient manner. A provincial energy policy must be economically rational, socially accountable and environmentally responsible, as defined below. This new policy should also be forward looking and consistent over time.

AUSTRALIA AND NEW ZEALAND

In 1999, Australia and New Zealand endorsed a joint energy policy framework. The framework recognizes that energy is a pervasive policy issue, i.e. concerned as much with broader economic, social and environmental issues as it is with energy supply and use. The framework identifies the following five key principles to guide energy decision-making:

- the central role of a reliable supply of competitively priced energy in maintaining and enhancing international competitiveness and the well-being of citizens;
- the need to encourage the development and use of less carbon-intensive energy resources and technologies;
- the need to improve efficiency of energy supply and use in meeting commitments arising from the Kyoto Protocol to reduce greenhouse-gas emissions;
- the central role of an open and competitive energy market; and
- the importance of predictability, transparency and clarity in government decision-making.

> "B.C. is competing for capital with other investment opportunities throughout North America. World-class expertise and investment can only be attracted through creation of the appropriate policy and regulatory conditions."
>
> *Mirant Canada Energy Marketing Ltd*

Economically Rational: An economically rational energy policy allows market forces to work. British Columbia has plentiful sources of energy, and demand for energy is growing in the province, throughout North America and around the world. Already a significant contributor to British Columbia's economy, the energy sector has excellent prospects for growth. The sector can play an even larger role in the province, generating value for consumers and increased revenue support for government services. It can provide opportunities for investment, business and jobs throughout the province. By diversifying into alternative energy sources and technologies, the sector generates additional economic benefits.

Socially Accountable: A socially accountable energy policy helps ensure the province's current and future energy resources are developed in a way that benefits British Columbians first and takes social costs into account. The needs of individual communities – those affected by the production of energy and those requiring a steady and reliable supply of energy – must be considered and balanced. The impact of energy policy on First Nations must also be recognized.

Environmentally Responsible: The world is increasingly concerned about global climate change. In addition, air quality and environmental protection are health and quality-of-life concerns for British Columbians. An environmentally responsible energy policy will ensure that resources are developed and used in an environmentally sound manner and that wherever possible, alternative energy sources and technologies are developed.

THE WAY FORWARD

The Task Force is mindful of the key competitive advantages British Columbia possesses by virtue of its geographic and geopolitical location as neighbour and trading partner of the United States. British Columbia is also part of the Pacific Northwest region, forging ever-stronger links in both infrastructure and trade. So, in addition to developing a competitive energy market, the Task Force recommends that government look to diversify its energy sources as outlined below.

Conservation, efficiency and alternative energy are often discussed, but seldom defined. In this report, the Task Force defines these terms and addresses a number of issues to help position these activities and energy sources as important components of British Columbia's overall energy supply.

> "A new energy policy must recognize the need to maximize energy efficiency and renewable energy sources in order to minimize emissions and to be consistent with responsible climate policy."
>
> *David Suzuki Foundation*

The move to competitive electricity markets in North America is already underway. The Task Force focuses on the larger policy and structural issues related to the electricity sector as British Columbia needs additional supply and does not yet have a competitive electricity market.

Natural gas commodity markets in North America are already deregulated and operate in a well-functioning competitive market. Today, natural gas serves as a major source of continental energy supply, a factor that changes the energy balance in the province. Consequently, in its report, the Task Force focuses on changes that will increase investment in this resource.

British Columbia has an abundance of coal. However, coal-fired electricity is absent in the province. The Task Force recommends that the Province develop an appropriate regulatory framework for the use of coal as an energy source.

Experience elsewhere has demonstrated that competitive energy markets will attract private capital and bring further energy supplies. Over the long term these markets lower consumers' energy costs and increase energy security and reliability. The more diverse the supply, the more certain British Columbia's future needs will be met. A growing energy sector will increase jobs and income in British Columbia, including revenues to support government services such as education and health care. Therefore, a diversified mix of energy sources and activities – conservation, efficiency, alternative energy, electricity, natural gas and coal -- makes good economic, social and environmental sense.

QUEBEC

Quebec's new energy policy emphasizes environmental management and sustainable development.

The new policy establishes an energy board to regulate the electricity sector in a transparent and equitable way while moving toward deregulation. An energy-efficiency agency will work with other government ministries to integrate energy conservation measures into future policies.

Consistent with Quebec's position as the world's third-largest producer of hydroelectricity, the policy focuses on this sector. It supports restructuring, encourages private-sector investment and liberalizes export controls. A strategy to ensure maximum spin-off benefits from hydroelectric development is being implemented. Hydro-Quebec is encouraged to become more efficient through strategic business alliances and technology marketing.

At the same time, the province is attempting to diversify its energy supply by ensuring optimal use of fossil fuels and by encouraging the use of alternative energy sources. Partnerships with First Nations and regional governments form an integral component of Quebec's energy future, as do commitments to reduce greenhouse gases and investment in research and development.

NEW BRUNSWICK

New Brunswick's recent energy policy aims to strike a balance among the following competing goals:

- ensuring a secure, reliable and cost-effective energy supply for residential, commercial and industrial users;
- promoting economic efficiency in energy systems and services;
- promoting economic development opportunities;
- protecting and enhancing the environment; and
- ensuring an effective and transparent regulatory regime.

An Energy Policy Secretariat is being established to support the following policy objectives:

- restructuring electricity to enable New Brunswick to move gradually toward a competitive electricity market;
- rapidly developing a natural gas infrastructure;
- increasing consumer information;
- providing greater price transparency;
- developing a comprehensive energy-efficiency strategy for all sectors of the economy; and
- developing a provincial climate change action plan.

PLANNING FOR THE FUTURE

British Columbia faces a number of major energy issues that were not part of the Terms of Reference for the Task Force. While many of them are mentioned in the Report, the following issues were outside the mandate of this Task Force and as a result were not given in-depth consideration:

- British Columbia's involvement in offshore energy development;
- current international discussions on climate change and the potential impact on the energy sector; and
- the growth of transportation in the province and the resultant effect on air quality.

These issues require additional attention by governments.

CHAPTER • 3

KEY STRATEGIC DIRECTIONS

To guide the Province and position British Columbia to take full advantage of its energy potential, the Task Force identified nine strategic directions. This chapter discusses these directions, while considering specific issues relevant to each energy sub-sector in the chapters to follow.

DEVELOP THE ENERGY SECTOR

There is a compelling need to develop the energy sector in British Columbia to ensure safe, reliable energy and to capture economic benefits.

British Columbians depend on a reliable supply of energy for personal and business use. The key participants in British Columbia's economy, such as forestry and high technology, cannot prosper without plentiful, reliable and cost-competitive energy. As the population increases and the economy grows, a strong energy industry will improve security of supply for all British Columbians. Security of supply includes providing consumers access to the forms of energy they choose as well as ensuring the energy is available when needed. It requires the energy industry to have secure access to the resource base.

The market for British Columbia's energy is increasingly continental. Demand is likely to grow as the United States looks to its immediate neighbours for secure energy supply. Increasing US demand for energy can only be met through growth in the sector. The employment, income and taxation benefits derived from energy development can form a foundation for a strong and diversified provincial economy.

British Columbia's potential to expand its energy sector is tremendous. Hydroelectric generation on the Peace and Columbia Rivers can be sustained and augmented by new sources, including generation by independent producers. In addition, the province's natural gas, coalbed methane and coal reserves are plentiful and proven, and there is a wide range of emerging technologies to support conservation, efficiency and the development of alternative energy sources. However, government cannot pick the "winners." It must allow the market to best determine which sources move to the forefront.

In order to expand, British Columbia's energy sector will need significant amounts of private-sector capital. But British Columbia faces direct competition for that capital with jurisdictions across North America, especially Alberta and Washington State. New investment in the sector depends on an attractive business climate, including an efficient and transparent regulatory environment that delivers prompt decisions and certainty for investors.

Energy development and economic growth are inextricably linked. Generally, without a secure and reliable source of competitively priced energy, business, industry and the economy cannot flourish. Likewise, business must have a suitable environment in which to grow if it is to provide the jobs and revenue that underpin the high quality of life enjoyed by British Columbians.

DIVERSIFY ENERGY SUPPLIES

A diversified energy supply is critical, given the role energy plays in a modern economy.

The British Columbia energy sector is part of an expanding and ever-changing North American – and ultimately global – marketplace. As price and market conditions shift worldwide, the North American energy market adjusts. To the extent British Columbia diversifies its energy sources, it will benefit from opportunities in the continental market and ensure security of supply at home.

British Columbia has a major head start in this direction. The province has significant sources of electricity and natural gas as well as a proven record of production, transmission and distribution. The growing demand for British Columbia's energy resources is demonstrated by the fact that, since 1957, half of the province's natural gas production has been exported to the United States. The province's vast coal supplies and the potential for both coalbed methane and coal-fired electricity present even more opportunities, given an appropriate regulatory framework.

Perhaps the most significant potential, however, lies with conservation, efficiency and alternative energy sources. With the world's attention directed on the need to protect the environment and combat global climate change, British Columbia has an opportunity to be at the forefront of these energy activities and sources. Technology can play a direct role. Conservation and energy efficiency are policy priorities. With its significant natural resources, British Columbia can take advantage of alternative energy, such as wind, wave and solar. Moreover, British Columbia industries are at the leading edge of perhaps the most exciting alternative energy development of the past century, the fuel cell.

> "…BC should aim to achieve diversity of electrical supply….encourage new supply to come on stream, and mitigate unnecessary price risks for consumers."
>
> *BC Business Council*

Good market signals and clear and certain regulatory processes will help to ensure both diversity and success for British Columbia's energy options.

PROVIDE A COMPETITIVE MARKET ENVIRONMENT

Energy development and prices are best determined in a competitive market environment. At the same time, the long-term hydroelectric investments made on the Peace and Columbia Rivers have created an endowment that will continue to benefit British Columbians for years to come. This endowment can be managed within a competitive market for electricity.

Competitive markets encourage private-capital investment in new energy sources, which ultimately improves reliability and security for the consumer and revenues for the Province. Competitive markets also facilitate conservation and efficiency. Without the appropriate price signals, however, these markets will not fully respond.

New electricity generation and transmission capacity is required. Normally, higher prices would provide the right signal so that capacity is expanded. In British Columbia, however, because electricity prices are a blend of old and new generation costs, this price signal to expand capacity is absent.

British Columbians still benefit from some of the lowest electricity rates found anywhere in the world. The long-term investments made on the Peace and Columbia Rivers are referred to as an endowment and generally pay British Columbians a dividend. The dividend is the difference between market prices for electricity and the cost of electricity generated on the two rivers. As a result, British Columbians are not paying full market prices for electricity.

In contrast, British Columbians already pay market prices for oil and natural gas. Competitive markets at the wholesale level already exist and the sector is flourishing. Fostering competition and providing more choice will benefit the energy sector and British Columbians.

There is also a need for fair competition among all energy sources and a greater need for conservation and energy efficiency. At present, pricing signals are inadequate and need to be improved.

Along with fostering competition and improving price signals, it is wise to move electricity to market rates over time. To do otherwise results in the continued inefficient use of energy and restricted competition and growth in the energy sector. The benefits provided by the hydroelectric endowment assets on the Peace and Columbia Rivers must continue to flow directly and indirectly to British Columbians. After all, these assets were developed for and by the people of the province.

RESTRUCTURE THE ELECTRICITY SECTOR

The electricity sector needs to be restructured. Market participants need fair transmission access.

Over the past decade, business has increasingly recognized that developing and focusing on areas of competency leads to competitive advantage and business success. Pursuing that strategy leads to dramatic improvement in business development, capital management, customer service, and operational and financial performance.

Functions such as electrical generation, transmission and distribution, all part of the current responsibilities of BC Hydro, represent very different businesses. Indeed, these functions comprise all aspects of a typical market without deriving the associated benefits. Being successful in any one of these areas does not require being active in the others. When distinctly different businesses are managed together, competencies are either not fully developed or become diluted as the priorities of each become indistinguishable.

The Province has a significant financial investment in the assets of BC Hydro and must receive an appropriate market-related return. For these organizational, competitive and performance reasons, BC Hydro should be restructured into distinct entities representing generation, transmission and distribution.

Some suppliers and most independent power producers perceive access to BC Hydro's transmission system as difficult and inequitable. Restructuring must address this perception and any underlying reality.

Without the separation of the transmission assets and the independent operation of those assets from the generation and distribution sectors, private-sector investment is unlikely. So, too, is British Columbia's continued ability to pursue cross-border trade, given US rules regarding inter-regional reciprocity of open access. Competitive markets also require generation and distribution to be separate commercial entities.

EXPAND ENERGY INFRASTRUCTURE

Transmission upgrading and expansion are essential to energy development and reliability. Electricity and natural gas transmission to markets in the east and south of British Columbia is critical.

The province's electricity transmission is aging. It needs upgrading and expansion.

Access to natural gas storage on or near the Lower Mainland and Vancouver Island is also critical. Natural gas storage, situated close to major markets, is common across North America. This storage provides a reliable and cost-effective way to meet periods of particularly high energy demand and reduce price volatility.

Other positive steps to improve access to the resource base and ensure that infrastructure is built in response to market need include innovative public-private partnerships, strong price signals and competitive returns. Private investment should be encouraged.

MAKE SOUND ENVIRONMENTAL DECISIONS

Energy efficiency and sound environmental policy are essential elements of a modern energy policy.

British Columbia's energy development will be sustainable only if undertaken using appropriate environmental practices. Export markets and British Columbians will accept nothing less. There are ways to increase conservation and extract efficiencies from the existing energy sector that will provide both environmental and cost advantages.

For the energy sector, there will be an increasing focus on the most efficient and effective means to reduce emissions. As a result, British Columbia should take bold, yet realistic steps to promote conservation, efficiency and alternative energy. It must be emphasized that our major hydroelectric resources are renewable.

Complete reliance on alternative energy to meet British Columbia's energy needs is still some time away. In the meantime, British Columbia can build on the competitive advantage of its natural gas and the potential of its coalbed methane, which are both relatively low in carbon and therefore attractive transition fuels.

ENCOURAGE RESEARCH AND CONSUMER EDUCATION

Appropriate policy, research and consumer education are essential.

Government has a responsibility to establish policies that encourage both the energy sector's growth and the research and development it needs to move forward. Access to the resource base is strongly influenced by government policy. As a result, the role of the Ministry of Sustainable Resource Management is critical, as is the completion of land-use plans for top-priority areas.

HARMONIZE GOVERNMENT REGULATIONS

Regulation of the energy industry should be based on best practices. Inter-governmental linkages must be strong.

With changing market forces in the energy sector, the role of government must change, but it is no less critical. A range of diverse and compelling interests must be balanced. Investors must have certainty that their energy exploration and development will not be hindered by excessive or unnecessary regulation. At the same time, British Columbians require and expect a safe, reliable and environmentally sound supply of energy. The nature of modern economics compels industry to be more efficient than ever before. Therefore, our regulatory regime must be results-based, transparent and balanced.

The provincial energy sector is increasingly dependent upon activities and decisions made in regional, national and international forums. The British Columbia government must play a major role in making decisions that serve provincial needs and priorities. The Province must actively engage the federal government on the following issues:

- First Nations;
- environmental assessment processes for all major projects, including the pipeline potential in the far North and BC's offshore;
- emerging continental energy policy;
- obligations related to the North American Free Trade Agreement; and
- federal/provincial cooperation on air-quality issues.

In addition, the Province must maintain effective linkages with its neighbours in Alberta, Yukon, Northwest Territories, Washington State, Idaho, Montana and Alaska.

INVOLVE COMMUNITIES AND FIRST NATIONS

Resource communities and First Nations have a role to play in energy policy, particularly as that policy applies in their areas.

Resource communities are the backbone of British Columbia. Their continued health and prosperity are vital to British Columbia's economy and its society. In addition, First Nations are now moving into the economic mainstream, though treaty negotiations and interim arrangements take time and outcomes are uncertain. One way to improve outcomes is to engage First Nations in the economic development of the energy sector.

> "While we acknowledge that it is not the mandate of the Task Force to develop aboriginal policy, we encourage the Task Force to impress upon government the need for effective policy in this area…."
>
> *BC Gas*

A prosperous and growing energy sector can provide hope to communities, whether resource-based or First Nations. Industry and government must work with and encourage the social, economic and capacity development of these communities.

CHAPTER • 4

CONSERVATION, EFFICIENCY AND ALTERNATIVE ENERGY

INTRODUCTION

A new provincial energy policy must reflect the integration of environmental and energy policy issues emerging in North America and around the world. Climate change has become one of the most prominent environmental and economic issues today. While air quality has actually improved in recent decades – especially in the Lower Mainland – it continues to be a growing concern for British Columbians. While parts of the provincial energy sector could face economic risk as a result of environmental expectations, the energy conservation, efficiency and alternative energy sectors can be part of the solution.

Recent global events have also highlighted the need for energy security and diversity. Increasing conservation and efficiency are very cost-effective ways to gain "new" energy supply to meet the demands of our growing population. British Columbia has a history of high per capita energy use, but there are opportunities to "free up" energy already being produced while maintaining our standard of living.

Conservation, efficiency and alternative energy sectors are driven by education and technology. Converging environmental issues and advancing technologies have accelerated their growth over the last decade. Costs have been reduced, making these sectors increasingly competitive with more traditional sources of energy supply (See topic box on the connection between alternative energy and price).

The International Energy Agency suggests there will be very significant global investment in these sectors over the next two decades. Indeed, two of the largest energy companies in the world, Shell and British Petroleum, have indicated that they are making major investments to prepare for the changing world energy scene. British Columbia is home to many globally recognized companies in these fields and is well positioned to take advantage of this growth. Much of the research conducted by these companies requires specialized facilities, particularly in the fuel cell, hydrogen and biofuel sectors.

Conservation, efficiency and alternative energy projects fit naturally into the new competitive market environment evolving across North America. They provide incremental gains to the electricity grid with low environmental impact. Moreover, many jurisdictions are now setting portfolio standards to support alternative energy – that is, requiring electricity distribution companies to acquire a percentage of their supply from alternative energy sources.

Conservation, efficiency, and alternative energy projects are labour intensive and create job opportunities for highly skilled workers. In addition, alternative energy technologies lend themselves well to community-level energy development in remote areas, where grid electricity is usually not available.

In British Columbia, the fuel-cell industry is recognized globally and directly employs more than 1,200 skilled workers. To foster development in other conservation, efficiency and alternative energy projects, government must ensure industry can attract the required investment to advance research, undertake pilot projects and commercialize applications.

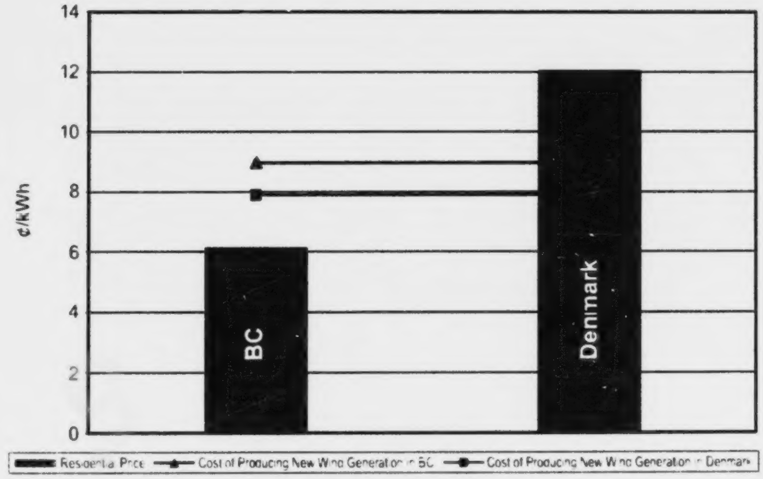
THE CONNECTION BETWEEN ALTERNATIVE ENERGY AND PRICE

Denmark relies on wind power for 13 per cent of its electricity. The remaining 87 per cent comes primarily from coal and gas-fired generation. British Columbia's hydroelectric power accounts for 86 per cent of its electricity. Although wind power generation costs are declining due to advances in technology, the cost of wind power in British Columbia simply cannot compete with that of hydroelectric power.

In Denmark, residential prices before taxes for electricity are approximately 12 cents per kWh, about double the cost in British Columbia (refer to Chart 1).

The cost of producing some types of alternative energy in British Columbia is declining. This fact, combined with future price increases for conventional energy, will make alternative energy more attractive.

Chart 1: Comparison of BC and Denmark Electricity Prices



Source Energy Policy Task Force Working Group on Electricity

This chapter provides definitions of energy conservation, energy efficiency and alternative energy and outlines examples of each. It discusses what British Columbia can do to promote the wise use of energy.

ENERGY CONSERVATION AND ENERGY EFFICIENCY

Definition

Energy conservation and energy efficiency are separate but related concepts that are often confused. Energy conservation is achieved when energy waste is reduced or eliminated. For example, turning off the lights conserves energy.

Energy efficiency involves getting the most productive use from the energy used. For example, a new furnace that produces more heat with the same amount of energy is more efficient than an old one.

In summary, conservation implies using less, while efficiency implies using specific technologies and best practices to do the same or more with less.

Demand-side management which pertains to conservation and efficiency, is used primarily by public utilities to modify the amount and timing of electricity and natural gas use by consumers.

Energy Conservation Measures in British Columbia

During the dramatic oil price shocks and supply shortages three decades ago, governments focused on securing energy supply, reducing imported oil consumption and increasing domestic energy sources. By the 1990s, energy efficiency and environmental protection also emerged as key priorities.

In 1990, British Columbia developed an energy policy, entitled "New Directions for the 1990s," with a theme of efficient, clean and secure energy. Since then the Province has implemented various energy conservation and efficiency measures, including the following:

- electricity pricing to influence the amount and types of energy consumers use.
- minimum energy-efficiency standards for products, equipment and buildings *(Energy Efficiency Act)*;
- tax exemptions for material and equipment that prevent heat loss from a building, for prescribed alternative energy sources and for natural gas and propane conversion kits for internal-combustion engines *(Social Services Tax Act)*;
- working with utilities, other agencies and the private sector to encourage energy efficiency facilitate community energy planning and enhance energy education; and
- government demonstration projects that showcase and evaluate energy-efficient technologies in government buildings and vehicles

How much energy could British Columbians actually save?

In 1988 a study entitled *Electricity Conservation Potential Review, 1988-2010* was published in British Columbia. This collaborative multi-stakeholder report suggested that about 27,000 GWh of electricity could be saved over the 22-year period. In the early 1990s, BC Hydro and UtiliCorp Networks Canada had aggressive energy-efficiency programs and the Province implemented the provisions of the *Energy Efficiency Act*. The BC Hydro savings accumulated so far are about 19,000 GWh. Based on the 1988 study, significant advances in technology and better awareness of conservation potential, additional savings are possible. The production value of these remaining savings has been estimated at $50 to $70/MWh. Compared to building new generation and transmission, these megawatts are competitive.

Why doesn't the current market lead to increased energy conservation and efficiency?

Poor price signals: In a blended-cost system, such as we have in British Columbia, consumers do not see price signals that encourage them to change their energy-consuming behaviour. This is because new costs of electricity production in British Columbia – which are higher than historical rates – are not shown, but blended into an average price. This is not the case for natural gas.

Lack of comparative price information: Energy consumption labeling on a product (e.g., 500 kWh/yr) does not give consumers enough information to determine the trade-off between higher capital costs and lower operating costs.

Volatile prices: Energy price volatility causes uncertainty about future energy prices and market conditions. As a result, investment in energy-efficient technology or building design may not be seen as cost-effective.

Third-party purchase decisions: People who purchase energy-using equipment (e.g., landlords, builders) often have an incentive to buy the cheapest appliances, since someone else will pay the operating costs.

How does British Columbia get to a more energy-efficient future?

Pricing: Electricity and natural gas prices should send the correct signals to consumers for their energy decisions – that is, prices should reflect the marginal cost of energy.

Time-of-use pricing allows customers to move their consumption from peak times to a different time of day to take advantage of a lower electricity or natural gas price. Puget Sound Energy has a successful pilot program on time-of-use pricing. Customer reaction has been "overwhelmingly positive" and 90 per cent of participating customers have altered their energy use behavior, including

ENERGY CONSERVATION MEASURES IN OTHER JURISDICTIONS

In recognition of past, present and future energy supply challenges throughout the world, conservation and energy efficiency principles are well-established in most jurisdictions.

Canada's Office of Energy Efficiency (OEE), which is part of Natural Resources Canada, has a mandate to strengthen and expand Canada's commitment to energy efficiency. The OEE keeps Canadians abreast of new technologies to reduce fossil-fuel use or transition to less carbon-intensive energy sources, including renewable energy.

Oregon's Office of Energy (motto: Saving Energy Saves Everything) provides information, demonstrates new technologies and offers a variety of programs to encourage Oregonians to conserve energy and use renewable resources.

The **Texas** State Energy Conservation Office has evolved from its original function of responding to fuel-shortage emergencies and administering federal energy conservation grants to its current role as a statewide promoter of energy efficiency and provider of energy management services.

The **California** Department of Conservation administers a successful Rebate and Demand Reduction Program that offers consumers grants, loans and rebates to install energy-efficient products or undertake other conservation or energy-efficiency measures.

> "Set new energy efficiency standards for vehicles, appliances and buildings."
>
> *Sierra Club British Columbia*

shifting use, reducing use, buying energy-efficient equipment, and installing more insulation.

Government regulation: Significant energy savings could be realized by updating and implementing new energy-efficiency standards in the *Energy Efficiency Act*. Areas for potential savings include updating standards for natural gas and oil furnaces and commercial and residential lighting. Commercial lighting represents about 50 per cent of BC Hydro's commercial customer load. In addition, there are no standards currently in force for water using equipment, much of which operates on electricity, or for residential equipment such as natural-gas fireplaces.

Regulations should also limit the growth of inefficient electric space heating. In 1994, about 18 per cent of BC Hydro's residential load was for electric space heating. According to the utility's latest load forecast, the residential share used for space heating increased to 24 per cent in 1999 and is expected to grow to 32 per cent by 2018. This growth is equal to one 390-MW generating station.

The province could save significant energy by ensuring that new construction incorporates other fuels to meet space-heating needs. The *Energy Efficiency Act* requires amendment to allow for market-based incentives and market transformation activities that promote higher efficiency standards for equipment and appliances and higher performance codes for new housing and buildings.

In addition, government, through the BC Utilities Commission, should require distribution utilities to develop and implement rate structures that encourage energy-efficient behavior and ensure that the transmission entity and distribution utilities can substitute demand-side management for new generation or transmission resources.

The Task Force recommends a re-write of the *Energy Efficiency Act* and Regulations.

The following are further energy conservation and efficiency measures that the government could consider:

- adopt national energy building codes;
- set efficiency standards for appliances;
- require all utilities to have power conservation and efficiency programs;
- accelerate tax write-offs for alternative energy systems; and
- utilize public-private partnerships to promote conservation, efficiency and alternative energy.

See Appendix 7 for a more complete listing of energy conservation and efficiency measures, some of which require federal action. There are opportunities for the Province to work together with the federal government to determine which conservation and efficiency standards can be improved.

ALTERNATIVE ENERGY

Definition

The terms "clean," "green" and "renewable energy" are often used interchangeably to describe various aspects of alternative energy, but typically refer to alternative means of generating electricity. Most operational definitions of clean, green or renewable include the following two characteristics:

- energy is generated from sources that are renewable or replenished within a reasonable time frame; and
- energy sources or technologies have minimal environmental impacts relative to conventional energy types and applications.

> "There must be a great push by this government to put green energy on the map...."
>
> *Hupacasath First Nation*

The Task Force considers large scale hydroelectric power generation renewable and has adopted a broad view of what constitutes alternative energy that includes the following:

- traditional technologies (e.g., solar, wave and geothermal energy);

- innovative technologies (e.g., fuel cells, advanced turbines, super-efficient burners);
- non-fossil fuel-based energy carriers (e.g., hydrogen, ethanol, biodiesel);
- small hydro; and
- progressive applications for conventional energy resources.

Therefore, alternative energy includes all energy sources and technologies that minimize environmental impacts relative to conventional energy sources and/or technologies.

> "It is also important to point out renewable sources such as solar and wind energy are intermittent and require backup by conventional energy technologies, such as hydroelectric, nuclear or gas-fired generators."
>
> *Murray Love* Times Colonist *Letter to the Editor, March 6, 2002*

British Columbia's Alternative Energy Sector

The development of the province's fuel-cell industry over the last decade is a prime example of the potential of British Columbia's alternative energy sector. Not only can this sector provide energy diversity and security for the province, but it can also contribute to the provincial economy and improve air and water quality. Appendix 8 provides a scan of the alternative energy sector in British Columbia. While the appendix does not rank applications, it summarizes areas of endeavor, identifies some of the barriers, and provides a high-level, qualitative assessment of potential.

From the scan, the following barriers to alternative energy, real or perceived, were identified:

- an uneven playing field between conventional and alternative energy development;
- barriers to market access;
- higher capital costs;
- various fiscal, regulatory and infrastructure barriers;
- gaps in institutional, investor and consumer understanding or awareness;
- the intermittent nature of many alternative energies (such as solar and wind); and
- environmental, First Nations and other land/marine use issues.

However, the scan also identified the benefits of alternative energy as follows:

- diversified sources distributed throughout British Columbia;
- local expertise in many technologies;
- numerous potential applications and cogeneration capabilities with conventional energy sources;
- potential to supplement or replace conventional energy sources, reduce fuel costs and improve air and water quality; and
- potential for significant emission reductions, emission-offset market trading and regional/provincial economic development.

What can the BC government do to increase the use of alternative energy?

Provide leadership in the following ways:

- commit to diversify BC's energy sources;
- ensure that alternative energy plays an increasingly important role in public buildings and in transportation;
- form a public-private foundation, comprised of senior representatives of industry, universities, government and public policy organizations to provide strategic direction to advance alternative energy in the province; and
- increase understanding of alternative energy through changes in the education curriculum.

Encourage economic development by taking the following steps:

- foster centres of excellence in alternative energy through innovative partnerships with the private sector, the academic community and the federal government;
- ensure business and educational institutions provide the necessary training in alternative energy; and
- provide tax incentives that promote economic development in alternative energy, as long as these tax incentives are consistent with good tax policy and put all energy sources on an equal footing.

Ensure the adoption of specific measures to promote alternative energy use:

- **Time-of-use pricing:** This type of pricing depends on the time of day energy is used. Higher prices are charged when demand is strongest. As a result, there are fewer peaks in demand, and the need for additional energy supply is reduced.
- **Net metering:** Net metering allows utility customers to generate their own electricity through alternative-energy generation systems (e.g., hydro, solar, biomass, wind power) and sell any excess energy back to the utility provider which credits them for the kWh generated. The customer can use that amount of power at a later date and, at the end of the billing year, the utility pays the customer for the remaining credit.
- **Set portfolio standards for alternative energy:** Portfolio standards are applied extensively in other jurisdictions. The challenge is to develop achievable portfolio standards that also signal the need to diversify energy supply.

> "Encourage the distribution company(s) to implement net metering."
>
> *Independent Power Association of BC*

- **Implement incentives and standards for alternative fuel use. While transportation initiatives are important, they are beyond the scope of this Report and therefore the following are suggestions only:**
  - require 10 per cent ethanol for gasoline in British Columbia;
  - extend tax exemptions to imported alternative motor fuels;
  - adopt an alternative-fuel vehicle reward program; and
  - advance alternative-fuel vehicle purchasing.

PORTFOLIO STANDARDS IN DENMARK AND TEXAS

Portfolio standards are now used in a number of jurisdictions around the globe. These standards are designed to encourage alternative energy use, recognizing that alternative energy is seldom competitive with conventional energy on price alone. This lack of price competition explains why alternative energy is still a small component of energy use, even in countries such as Denmark. Although it is a major producer of energy, Texas is considered a leader in the United States in this area. The following provides additional information on portfolio standards as used in both Denmark and Texas.

Denmark

- Portfolio standards apply to electricity distribution companies, with incentives provided for meeting these standards.
- In 2000, alternative energy supplied 11.7 per cent of total energy consumption in Denmark.
- Through portfolio standards and other measures, Denmark aims to have 20 per cent of total energy consumption from alternative energy by 2012.

Texas

- Texas introduced portfolio standards for alternative energy in 1999.
- As a result, there are now a number of wind projects in operation.
- By 2009, Texas plans to have 2.2 per cent of total energy consumption from alternative energy.

THE POLICY RESPONSE

For British Columbia, the policy response to conservation, efficiency and alternative energy must be bold, yet realistic. In the longer run, we are moving to a world that will rely more on alternative energy. In the intervening years, this will require innovative direction consistent with the following factors:

- the importance of market behavior, supported by strong price signals, to increase innovation in energy conservation, efficiency and alternative energy;
- BC's significant investments in hydroelectric power resulting in that sector being largely renewable;
- BC's competitive advantage in natural gas – an important transition fuel as North America moves to greater use of alternative energy;
- alternative energy reliance must be incremental – at present, alternative energy is not sufficiently reliable, available or cost-effective to warrant a total shift from conventional to alternative energy sources; and
- the need for extensive private-sector involvement.

GLOBAL EXAMPLES OF ALTERNATIVE ENERGY DEVELOPMENT

Other jurisdictions have developed policies that encourage alternative energy development and their examples (described here) can provide valuable insight for British Columbia as it seeks to develop its new energy policy.

Norway

Historically, Norway's relatively low electricity prices (hydropower accounts for 99 per cent of its electricity) and large offshore oil resources have limited its renewable energy development. However, Norway is now actively engaged in renewable energy research and development to increase domestic use, establish new businesses and/or expand existing industries, and increase renewable energy technology exports.

Japan

With no oil or natural gas and very little coal, Japan has historically relied on imported fuels. After the oil shocks of the 1970s, Japan improved its energy efficiency and the security and diversity of its energy supplies by developing alternative energy sources. A renewable energy target of 3.2 per cent of total supply has also been set.

California

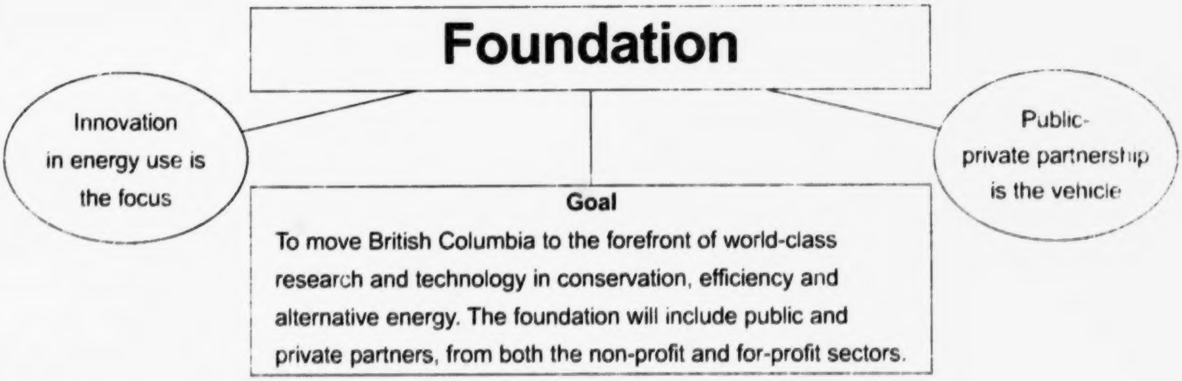
By employing a wide range of measures (including green-building incentives, alternative/renewable energy tax exemptions/rebates, electric-vehicle infrastructure incentives, net metering, construction/design standards and public education), California's total energy use from renewable sources is approximately 12 per cent. In addition, a renewable portfolio standard requires utilities to obtain 20 per cent of their energy from renewable sources by 2010.

Quebec

Quebec has positioned itself as a participant in renewable energy markets. It is the only Canadian member in the International Ethanol Coalition which advances the use of ethanol. In addition, Canada's largest wind plant is located in the Gaspé region of Quebec and the province actively promotes the use of biomass.

NEW FOUNDATION

A Foundation for Conservation, Efficiency and Alternative Energy



Foundation

Innovation in energy use is the focus

Public-private partnership is the vehicle

Goal

To move British Columbia to the forefront of world-class research and technology in conservation, efficiency and alternative energy. The foundation will include public and private partners, from both the non-profit and for-profit sectors.

This foundation would take energy conservation, efficiency and alternative energy use to a new threshold.

- The governing body would consist of leading experts on conservation, efficiency and alternative energy. These experts would be from:
  - industry;
  - universities;
  - government; and
  - public-policy organizations.
- The foundation would provide advice and guidance and report to the Minister of Energy and Mines.
- The foundation would provide advice and guidance on the following:
  - conservation;
  - efficiency;
  - demand-side management;
  - alternative energy;
  - public education; and
  - information and research on emerging energy trends.
- Funds would be provided by:
  - a portion of the dividend on the endowment assets;
  - private sources; and
  - possibly other governments, including the federal government.
- Benefits of the foundation would include the following:
  - funding for:
    - energy and energy-technology projects,
    - emission-reduction projects that have positive cost/benefit ratios, and
    - policy research;
  - the avoidance of subsidies and the picking of winners; and
  - reliance on scientifically based analysis.

New Foundation

There is a pressing need for a comprehensive agenda for conservation, efficiency and alternative energy in British Columbia, supported by sound public policy and financial resources. The topic box outlines an innovative foundation to develop and drive the agenda for conservation, efficiency and alternative energy. This foundation goes beyond a traditional conservation office. It reports to the Minister of Energy and Mines and is a first for British Columbia, drawing on experience with such initiatives elsewhere, particularly in California. The foundation is a public-private partnership with a portion of its funding derived from the dividend on the endowment assets. Therefore, it has some of the characteristics of Nova Scotia's recently announced Offshore Heritage Trust.

SAMPLE PROJECTS FOR THE FOUNDATION

Sample Project: Public Building

The foundation could lead the development of "demonstration" public buildings (e.g., a school, government office, hospital or university centre) that would apply innovative energy conservation, efficiency and alternative energy technology. For example, the building could use hydrogen fuel cells, wind turbines and solar collectors. It could be designed to minimize energy for lighting, heating, cooling and ventilation. It could also have additional "green" features such as recycled building materials and rainwater collection. The measurable outcome of the project would be a building that has reduced greenhouse-gas emissions and is a net "energy creator." It could also serve as a research and development project for the energy conservation, efficiency and alternative energy industries.

The foundation could fund the difference between the least-cost solution for a conventional building and the cost for the building as determined through a request for proposal. Subsidies would not be provided to individual firms; the funding would be entirely project specific. The project funding could be recouped through lower operating costs over time, particularly if the building achieved its goal of being a net energy creator and could sell its excess energy through net metering.

Sample Project: Wind Power

Wind power is becoming a more attractive energy source in a number of jurisdictions, including British Columbia, Alberta, Quebec, Texas and Denmark, among others. Vancouver Island could provide an ideal location for developing wind power generation in British Columbia. In addition, with the recent funding made possible by the federal government, wind power generation could become a successful project for community and First Nations involvement.

Portfolio Standards

The Task Force is making a special case for portfolio standards for renewable energy. These standards would apply to electricity distribution companies.

In providing comments to the Task Force, a number of stakeholders recommended the use of portfolio standards. Even though portfolio standards run counter to strict market principles, they can be useful mechanisms when a fundamental shift in energy supply is required. The Task Force believes a shift to greater reliance on renewable energy makes sense, particularly given the advances in alternative energy.

Portfolio standards have been used extensively in other jurisdictions. Today, BC Hydro has a 10 per cent voluntary standard for alternative energy, pertaining to all incremental growth in electricity supply. If used wisely, portfolio standards can help to introduce new energy sources into the electricity supply but they need to be developed without public subsidy. They also need to be realistic about what the market can generate, cost effectively.

> "We believe that… [a low-impact renewable energy portfolio standard for electricity retailers]… needs to be included in a future energy policy in British Columbia. …"
>
> *Pembina Institute*

To encourage renewable energy production in Canada, the federal government, in its December 2001 budget, made up to $260 million available to fund wind projects. This will help to address climate change and improve air quality. The Task Force recommends the Province take full advantage of this opportunity.

For British Columbia, an appropriate energy portfolio standard is thought to be in the range of 30 per cent of all new supplies of electricity. This target will be subject to ongoing review and refinement by the foundation referred to earlier.

Today, British Columbia is in the enviable position of having 86 per cent of its electricity in renewable form, mainly as the result of large hydroelectric generation. Even with a 30 per cent portfolio standard applied to electricity distribution companies for all new supplies of electricity, this percentage would decline from 86 to 82 by 2010. However, a major hydroelectric power addition, such as Site C on the Peace River, would move the percentage above 86 per cent.

A high proportion of electricity from renewable sources is consistent with the energy mix of the future where renewables will play an increasingly prominent role. To maintain its relative advantage in renewable energy use, British Columbia should keep this percentage above 80 per cent.

Time-of-Use Pricing and Net Metering

The Task Force also recommends the implementation of time-of-use pricing and net metering as specific energy conservation and efficiency initiatives.

New Directions

These initiatives – a public-private foundation, portfolio standards, time-of-use pricing and net metering and a rewrite of the *Energy Efficiency Act* and Regulations – constitute bold new directions for energy policy in this province.

Finally, it should be emphasized that this Report has a wide range of initiatives, including those referred to above, that address environmental issues, particularly with respect to air quality. Some of the more important ones contained in other chapters are summarized below:

- full market prices for electricity (see Chapter 5);
- flaring standards for natural gas (see Chapter 6);
- waste-gas disposal (see Chapter 6); and
- final emission guidelines for all carbon-based fuel (see Chapter 8).

RECOMMENDATIONS

The Task Force recommends the Province or agency responsible take the action outlined below.

4.01 Use a portion of the endowment dividend to establish a foundation that supports comprehensive research and development in conservation, efficiency and alternative energy.

4.02 Set portfolio standards for renewable energy; these standards would apply to electricity distribution companies.

4.03 Adopt time-of-use pricing and net metering.

4.04 Rewrite the *Energy Efficiency Act* and Regulations.

4.05 Develop a wind project with private-sector expertise using federal funding as announced in the federal budget of December 2001.

CHAPTER • 5

ELECTRICITY

INTRODUCTION

Electricity is a key component of British Columbia's overall energy sector. Even so, the electricity sector could be developed further for both domestic and export use. If planned properly, an expanded electricity sector can provide a secure and reliable supply at competitive prices for consumers. Moreover, electricity development offers important employment and income benefits for all British Columbians.

> "We are convinced that there are a number of opportunities for the development of additional generation that could be done most efficiently by the private sector."
>
> *Joint Industry Electricity Steering Committee*

BC Hydro, a provincially owned Crown Corporation, supplies nearly all of British Columbia's electricity demand. The Crown Corporation owns approximately 80 per cent of the generation and transmission systems in British Columbia and through its subsidiary, Powerex, does the majority of BC's electricity trading with other jurisdictions. Its sales represent about 90 per cent of domestic sales. Investor-owned UtiliCorp Networks Canada (formerly West Kootenay Power) services approximately 125,000 customers in the southeastern area of the province.

Other investor-owned utilities include Hemlock Valley Electrical Services, Princeton Light and Power, Yoho Power and Yukon Electrical Company. Some large industrials, such as Alcan and Teck Cominco Limited, have on-site generation, and a handful of municipalities (Grand Forks, Kelowna, New Westminster, Penticton and Summerland) operate distribution facilities that purchase their supply and transmission requirements. Nelson Hydro is a vertically integrated utility that owns and operates substations, generation and transmission facilities and contracts for supply to meet a portion of its demand requirements.

Electricity rates across Canada and the Western United States are shown in Appendix 9. Rates in British Columbia, Manitoba and Quebec are among the lowest. Residential electricity rates in Alberta are significantly higher than those in British Columbia. For the most part, low electricity rates in BC are due to the following factors:

- BC Hydro's generation and transmission assets were constructed approximately 35 years ago and are now depreciated. For the older dams, BC Hydro calculates a cost-recovery price and a return based on equity – not on current value, nor on replacement costs of the assets. These pricing methods leave little funding available for future expansion or asset replacement;
- government policies such as rate freezes over the past nine years; and
- no major additions to generation or investment in transmission completed since 1984.

British Columbia's relatively low electricity rates have created a false sense of security for electricity consumers. This chapter explains the risks of this situation and provides some specific policy guidance on how British Columbia should develop its electricity sector. This guidance is provided within the context of growing world demand for energy. It addresses the potential for electricity to be generated from a wide variety of sources. It considers a world that will be relying more on alternative energy and less on fossil fuels in the decades ahead.

In the past, it was common for electricity utilities across North America to be vertically integrated and regulated, undertaking all aspects of generation, transmission and distribution. This was particularly true for publicly owned utilities, and BC Hydro was no exception. In reality, these functions are quite distinct, requiring different operational expertise. As a result, it is not surprising that the current focus across North America is to separate the functions and to establish commercial companies that specialize and compete in one of the three areas. When management is focused on functional competence, organizational success is more likely. These functions, as carried out in British Columbia today, are outlined below.

Generation

British Columbia has approximately 13,900 MW of dependable generation capacity. BC Hydro's generation capacity is approximately 11,000 MW. There is also approximately 2,900 MW of capacity provided by Alcan, Teck Cominco Limited, independent power producers, UtiliCorp Networks Canada and industrial on-site self-generation.

MAJOR DEVELOPMENT IN ELECTRICITY IN BRITISH COLUMBIA

1947	• creation of the BC Power Commission
1962	• creation of BC Hydro and Power Authority from an amalgamation of the Power Commission with the former BC Electric Railway Company
1964-1984	• large development projects on the Columbia and Peace Rivers
1980	• BC Utilities Commission established and becomes regulator of BC Hydro
1988-1989 & 1995	• BC Hydro requests proposals for new generation from independent suppliers
1996	• BC Hydro and West Kootenay Power offer wholesale transmission services • Powerex, a wholly owned subsidiary of BC Hydro, is granted Power Marketing Authorization allowing it to trade in the United States and deliver power to end-use customers in certain areas
1998-1999	• West Kootenay Power offers retail access to industrial customers
1999-2002	• US Regional Transmission Organizations form to encourage electricity trading among utilities • Independent power producers receive BC Utilities Commission approval to access BC Hydro's distribution system

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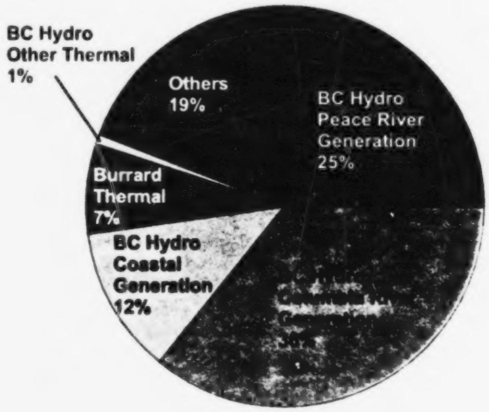
BC Hydro's generation comprises small hydro, Burrard Thermal and the government-developed major projects on the Peace and Columbia Rivers. It is those major projects – the two-river system – that have endowed the province with low energy prices.

Electricity capacity in British Columbia is shown in Chart 2. The electricity capacity from BC Hydro's endowment assets is 61 per cent of total capacity in the province. Capacity from other BC Hydro assets, such as Burrard, is 20 per cent while the remaining 19 per cent comes from other sources in the province.

Chart 2: British Columbia's Electricity Capacity 13,900 MW (2001)



Source Energy Policy Task Force Working Group on Electricity

The endowment assets owned by BC Hydro on the Peace and Columbia Rivers have been generating electricity at below market rates. The difference between the cost of this generation and market rates provides BC consumers with a dividend. The treatment of this dividend is a key energy policy issue that will be addressed later in this chapter.

As shown in Chart 3, the annual generation of the electricity from the endowment assets varies considerably, depending on the water levels in the reservoirs. For example, 1996 was a high-water year and output from the endowment assets was well above 45,000 GWh. On the other hand, 1995 was a low-water year and electricity output from the endowment assets was below 30,000 GWh, a difference of 15,000 GWh from the high-water year. This large variability has significant implications

For planning purposes, it is prudent to use average annual electricity output from the endowment assets and factor in the variability of the system. More will be said about variability in the supply/demand outlook later in this chapter.

As outlined later in the chapter, new electricity supply will be required to meet future demands. It may be generated from natural gas, coal, conventional hydro power or alternative sources such as small hydro projects, wood residue, tidal and wind power

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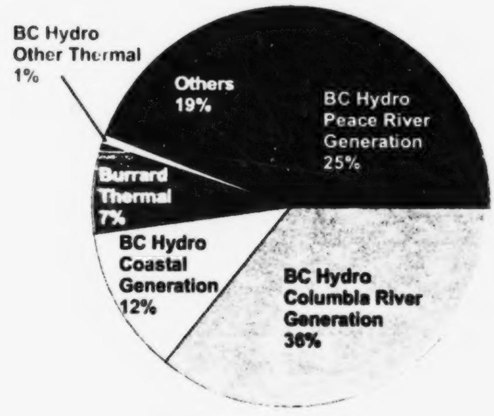

Source: Energy Policy Task Force Working Group on Electricity

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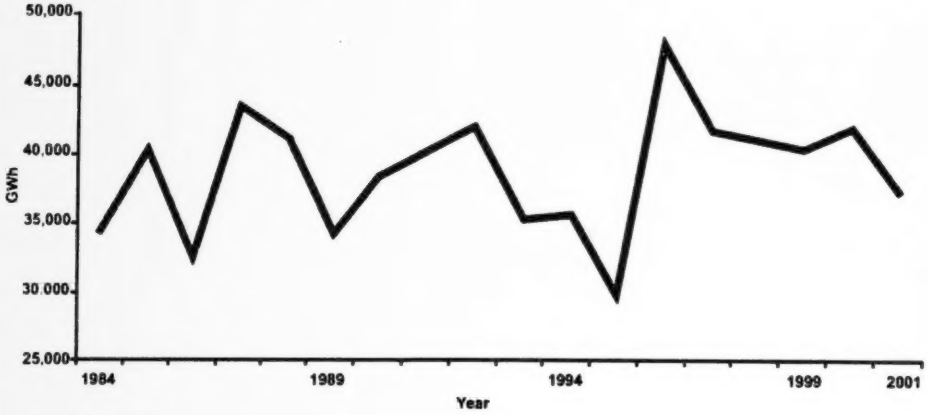
Chart 3: Annual Variability in Endowment Asset Generation



Source: BC Hydro

The advent of smaller, geographically distributed electrical generation facilities, brought about by new technology, has dramatically altered the electrical generation business. Generally, the mega-power projects of the past have given way to these smaller projects, be they renewable energy based or cogeneration. Usually built by private enterprise, these projects rely on competencies and efficiencies not normally found in large utilities.

The Importance of Burrard Thermal and the Williston Reservoir

Strategically located in the Lower Mainland, Burrard Thermal is an important component of BC Hydro's electricity supply mix. By virtue of its location it reduces transmission costs and plays a critical, although not well understood, role in balancing the BC Hydro system. The future of Burrard Thermal is now a policy issue for government. Both the importance and the economic value of Burrard have been demonstrated, as has the means to compensate for its air emissions in the Lower Mainland. If required, government can direct that Burrard Thermal's efficiency be increased through investment in state-of-the-art combined-cycle gas-fired turbines. Conversely, Burrard can be replaced, recognizing the cost of replacing it is estimated at $1 billion. In either case, without Burrard Thermal, additional supply within the province is required immediately. This option is not realistic now, given the lead times involved for new projects.

Reservoirs – which are storage facilities – play essential roles in hydroelectric power generation, particularly in low-water years. The Williston Reservoir plays a direct role in supporting electricity generation on the Peace River. The current water license for the Williston Reservoir permits the use of

32 million acre-feet of storage below the 2,205 foot level. As such, the minimum permitted elevation of the Williston Reservoir is 2,106 feet. However, there have been requests to restrict the minimum level to 2,150 feet because of potential impacts on industrial and some recreational interests. Restricting access to water between 2,150 and 2,106 feet has significant financial and electricity supply implications. The amount of energy stored in Williston between the elevations of 2,150 feet and 2,106 feet is about 6,200 GWh. In general, a 2,150-foot constraint can be characterized as one which has a relatively low probability of impacting system operation, but one which may have a high cost consequence. If that stored energy is not available for release during a drought period, then the firm energy capability of the BC Hydro system is reduced by about four per cent. This is equivalent to a requirement for an additional 250 MW generator.

Transmission

In British Columbia there are approximately 18,000 km of transmission lines, 300 substations, 4 control centres and 80,000 hectares of right-of-way. The BC Utilities Commission has approved wholesale transmission service terms requiring BC Hydro and UtiliCorp Networks Canada to operate their transmission systems as a common carrier.

The electricity transmission system, largely owned by BC Hydro and UtiliCorp Networks Canada, is aging. Approximately 80 per cent of the infrastructure was built between 1965 and 1982, and the remainder is more than 40 years old. Significant capital expenditures will be required in the near future to maintain reliability and improve capability.

At the same time, British Columbia is becoming integrated into a regional electricity market crossing both provincial and international boundaries. British Columbia is both an exporter and an importer of electricity, and was a net importer in fiscal year 2000/01. (See Chart 4 for the transmission capability between British Columbia and neighbouring jurisdictions.)

The factors cited above, along with the need to harness private capital to make the transmission upgrades and expansion, mean that special attention must be paid to transmission. More will be said about this later in the chapter.

Distribution and the Consumer

Distribution includes owning and maintaining the lower-voltage distribution transmission system, customer service and billing, meter reading and administration. Distribution companies acquire electricity and supply power to residential, commercial and industrial customers. Industrial customers on UtiliCorp Networks Canada's system are allowed to acquire their own supply. There are approximately 59,000 km of distribution lines in the province.

The numerous utilities in the province serve as few as 30,000 customers to as many as 1.6 million customers. BC Hydro is the dominant utility.

From the consumer's perspective, highly reliable and efficient distribution services are essential. These services are as important to business as they are to the typical household in British Columbia. Although energy efficiency has improved significantly, most households use more electrical appliances today than when BC Hydro was established. In addition, the computer age has resulted in a rapidly growing demand for a secure and reliable electricity system.

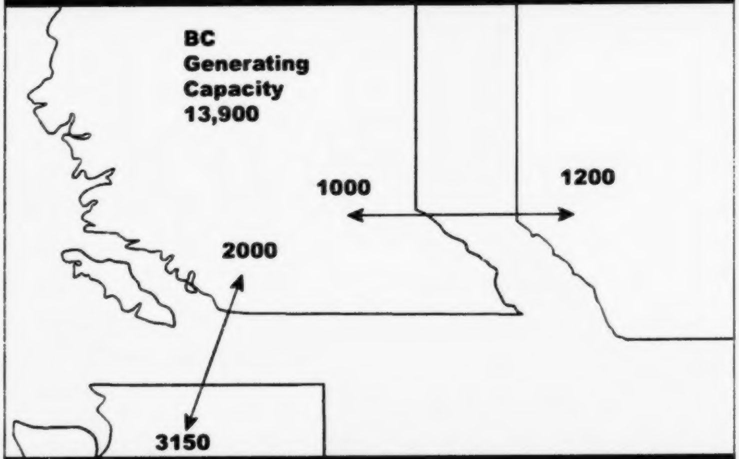
Electricity rates are normally determined by the British Columbia Utilities Commission. For the last nine years, however, BC Hydro's rates have been frozen by government. During the last two decades, very little new electricity infrastructure has been developed.

Supply/Demand Outlook and Vancouver Island's Special Case

Chart 5 shows the provincial electricity supply/demand outlook from 2002/03, the coming fiscal year, to 2009/10. Supply resources include the endowment assets, other assets of BC Hydro (including Burrard Thermal), as well as the electricity capacity of other generators in the province (see Chart 2).

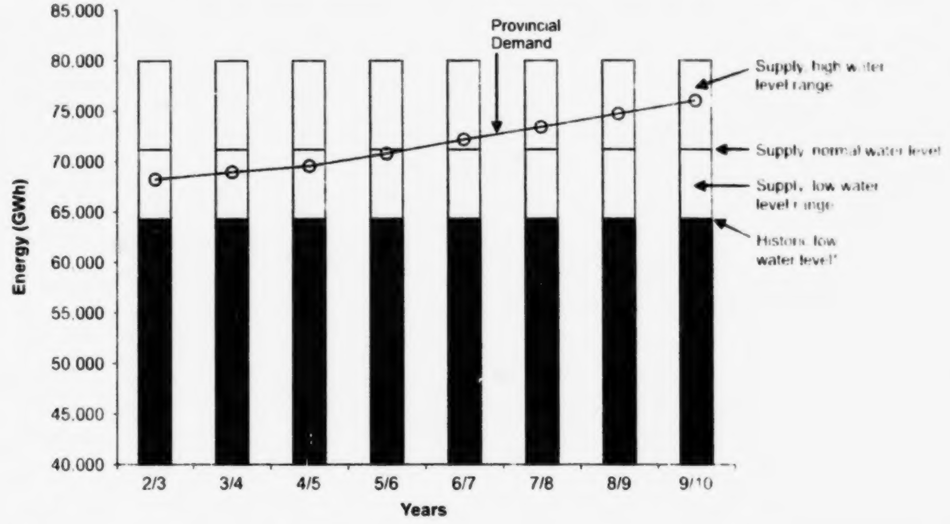
The demand forecast is the probable case as provided by BC Hydro and UtiliCorp Networks Canada; it is realistic, i.e. neither optimistic nor pessimistic. This forecast was

Chart 4: BC Generating Capacity and Pacific Northwest Transmission Capability, MW



Source: BC Hydro

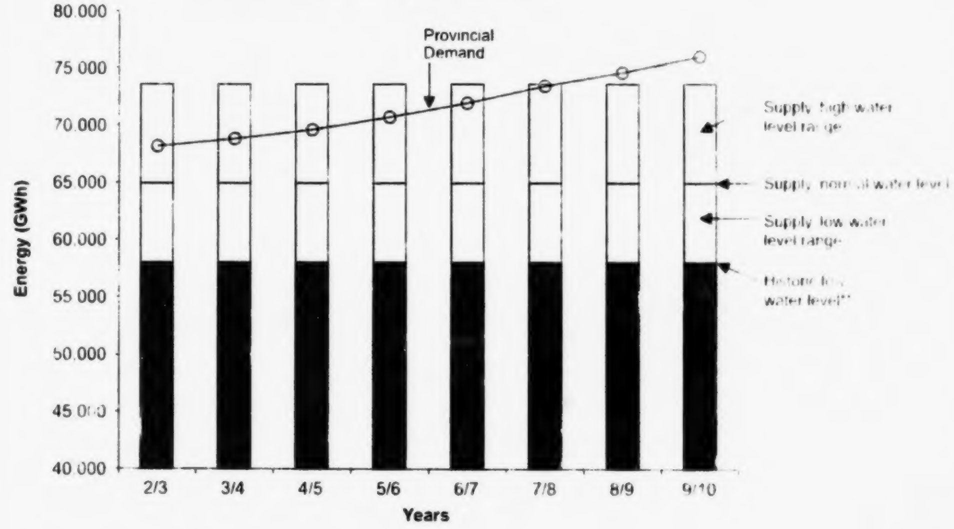
Chart 5: Provincial Electricity Supply/Demand Outlook



*Includes supply from all existing sources

Source: Energy Policy Task Force Working Group on Electricity based on data from BC Hydro and UtiliCorp Networks Canada

Chart 5a: Provincial Electricity Supply/Demand Outlook Excluding Burrard Thermal



**Includes supply from all existing sources except Burrard Thermal

Source: Energy Policy Task Force Working Group on Electricity based on data from BC Hydro and UtiliCorp Networks Canada developed after September 2001, and therefore assumes slower economic growth. In addition, the demand forecast includes an 8 per cent contingency for unforeseen events, which is lower than the 15 per cent that many jurisdictions use.

Chart 5a contains the same supply/demand data contained in Chart 5, but removes Burrard Thermal from the available supply of energy. Chart 5a illustrates that additional supply would be required now as demand exceeds supply in all years, assuming normal water levels. Although Burrard Thermal could be replaced by other supply options, this would take several years and require significant investment.

The supply/demand outlook shown in Charts 5 and 5a provides three key messages for policy makers.

First, assuming normal water levels each year, British Columbia's supply is sufficient to meet demand only until 2006/07, and then demand exceeds supply as a result of ongoing population and economic growth. Given the relatively long lead times from project approval to actual delivery of electricity, new supply needs to be approved and developed now. As outlined in the topic box on Vancouver Island, decisions on additional electricity supply can take a long time.

Second, if low water levels occur in the next few years, British Columbia will have to rely again on net imports. Net imports are not new for the province. In the current fiscal year, 2001/02, we anticipate net imports for electricity of approximately 6,000 GWh or 11 per cent of domestic demand. Given our physical transmission connections with Alberta and Washington State, this level of imports is not a problem. However, when our water levels are low, the water levels of other jurisdictions nearby are also often low. The result is upward pressure on electricity prices. In other words, in addition to risking security of supply, relying on net imports can be costly, as California experienced in 2001.

Third, the current supply/demand outlook makes no provision for growth of the electricity sector to meet the opportunities of the export market. As a result, the benefits of export – employment, income and revenue to government – are lost. This lost opportunity is significant, given the need to increase employment in the province as well as provide revenue to support health, education and social programs.

> "…enable British Columbia electrical generators to participate more effectively in North American export markets."
>
> *Calpine Canada*

New electricity supply is needed now and on an ongoing basis to meet domestic demand, avoid net imports where possible, and gain the benefits of exports.

The need for new supply is further complicated by the need to attract private investment. There is a new fiscal reality in the world, and British Columbia in particular, as governments look to private investors to fund new generation and assume project risk. Therefore, a market to attract private-sector generation needs to be in place. In British Columbia's case, this new market for electricity must link with our neighbours, Alberta and Washington State. As indicated, regional interdependence for electricity is already a reality. This market must be developed carefully, building on successes in other jurisdictions and avoiding the lack of regulatory foresight and timing problems that have plagued California and Alberta respectively.

More will be said about market reform later in this chapter. The Task Force has concluded that British Columbia has an immediate need to secure additional electricity generation. This will require forward planning and timely decisions. Without any action, British Columbians who use electricity will face diminishing security and reliability of supply and the price volatility that accompanies supply shortages.

VANCOUVER ISLAND – A SPECIAL CASE

Vancouver Island is a capacity-constrained system with a peak demand of about 2,139 MW, provided primarily by supply from aging submarine cables from the Mainland. On-Island generation consists of 448 MW of hydroelectric generation and 240 MW from the gas-fired Island Cogeneration plant, which is limited to 125 MW on peak winter days due to insufficient natural gas pipeline capacity (see Chart 6).

The natural gas pipeline that currently serves Vancouver Island is fully contracted during the five winter months. Consequently, there is insufficient capacity to serve new loads (i.e. increased domestic space-heating requirements, commercial and industrial end-use needs), as well as existing natural gas-fired electricity generation. There is a need for additional pipeline capacity.

As far back as 1990, BC Hydro identified that the value of generation on Vancouver Island was higher than anywhere else on BC Hydro's system. In 1992, the Province developed an Independent Power Producers Supply Policy which required BC Hydro to seek new supply from the private sector. With a need for new supply, BC Hydro developed a process to obtain it.

In 1994/95, BC Hydro issued a request for proposals, which included locational credits for generation. As a result, the Province announced two wood-residue proposals: Purcell Power at Skookumchuk and Interfor at Prince George. An Independent Power Producers Review Panel evaluated five other projects, including the financial, social and environmental impacts of each, and compared them with upgrading Burrard Thermal. Burrard was BC Hydro's preferred resource, but plans required building a new transmission line to serve Vancouver Island.

Of the five other projects, two gas-fired proposals on Vancouver Island were ranked first and second, followed by small hydro projects. The Province then directed BC Hydro to enter into negotiations with the proponents of both gas-fired proposals. The Island Cogeneration Project at Elk Falls received project certification and is currently undergoing testing but is not running at capacity. The proponents of the Port Albemi Cogeneration Project also received project certification. However, lack of a project agreement and local zoning approval have BC Hydro and at least one proponent looking for a new site on Vancouver Island, at this time in the Nanaimo area.

VANCOUVER ISLAND – A SPECIAL CASE (continued)

In 1996, BC Hydro issued a request for proposals for pipeline capacity to serve its requirements at Burrard and Vancouver Island. After evaluation, the Williams Pipeline proposal, starting at Huntingdon and crossing the international boundary, was chosen as the pipeline project to serve Vancouver Island. Williams and BC Hydro entered into a joint venture, Georgia Strait Crossing Ltd., and are currently seeking regulatory approval from the National Energy Board to construct, own and operate a pipeline.

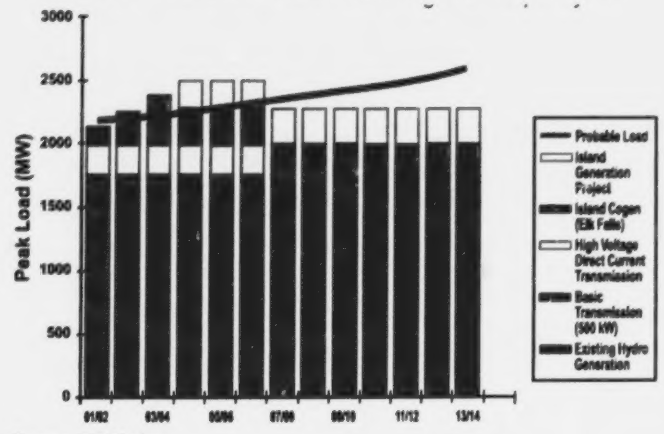
Throughout the process, BC Hydro has considered two options for Vancouver Island: additional gas-fired electricity generation and the need for a new natural gas pipeline or new transmission, the latter being more expensive and requiring new generation capacity elsewhere in the province along with required transmission upgrades. Chart 6 assumes the first option.

It should be noted that the Task Force received suggestions on meeting Vancouver Island's energy needs with alternative energy. Except for limited opportunities such as wood waste or municipal waste, other potential on-Island supply sources currently cost more than natural gas-fired electricity generation and cannot reliably meet demand. For example, BC Hydro estimates that there is about 3,500 GWh/year of potential supply from alternative energy. However, due to the intermittent nature of these resources, such as wind power, they cannot reliably meet peak demand unless there is considerable investment in backup supply or energy storage systems. Moreover, even if these resources could meet demand, they still need to be developed as they are not immediately available.

As a winter storm in December 2001 clearly demonstrated, the reliability and security of electricity supply for Vancouver Island is in question. Several conclusions can be drawn from the Vancouver Island experience, as follows:

- new supply is required now on the Island and transmission upgrades (requiring new generation elsewhere) and gas-fired electricity generation appear to be the most cost-effective and timely options;
- Vancouver Island has the potential for alternative energy development and this should be pursued. Even if additional gas-fired generation is built, Vancouver Island can be a net provider of energy to the rest of the province;
- new transmission options were assessed by an Independent Power Producers' Review Panel in 1996 and rejected due to technical uncertainties and cost; and
- the project approval process needs to be streamlined and more timely.

Chart 6: Vancouver Island Regional Capacity Balance



Source. BC Hydro.

The Pricing of Electricity

Today, British Columbia faces a gap between the cost of electricity generated by its endowment assets, i.e. the BC Hydro dams on the Peace and Columbia Rivers, and the cost of producing electricity from new generation plants.

> "Our experience and that of many others, suggests that the public responds quickly and effectively to a clear market price, that is more reflective of the true cost for energy. In essence the price becomes both a regulator of wise consumption and a motivator leading to the development and introduction of new technologies."
>
> *UtiliCorp Networks Canada*

With respect to generation, the current benchmark for comparing potential supply opportunities in North America is the cost of combined-cycle natural gas facilities. Assuming a long-term natural gas price of US$3/MMBTU (million British Thermal Units), this results in an estimated electricity cost for new generation of between Cdn$48/MWh and $52/MWh. This corresponds closely to BC Hydro's current non-hydroelectric supply costs. The current embedded cost (fixed costs including return on equity and variable costs) of hydroelectric endowment assets, is estimated at $20 to $25/MWh.

Currently, the costs of all electricity supplies are blended into an average generating cost in British Columbia. This average generating cost is then added to the transmission and distribution costs to provide a delivered price. Under this approach, the delivered price provides inadequate market signals, as consumers see a blended price, which does not reflect today's market price. Poor market signals – resulting from the gap between the cost of supply from endowment assets and the cost of new supply – must be addressed if new sources of supply are to be developed when needed.

Chart 7 outlines the difference between current electricity prices paid by consumers in British Columbia and forecast long-term market prices for new electricity supply based on natural-gas generation. These prices include the cost of generation, transmission and distribution with prices for residential, commercial and industrial customers. The benchmark long-term market price for new electricity generation is based on a long-term natural gas price of US$3/MMBTU, the consensus forecast across North America.

Also shown is an electricity price based on natural gas of US$2/MMBTU, which is the March 2002 short-term price for natural gas.

PRICE CHANGES FOR A HOUSEHOLD

An average household in Fort St. John currently pays approximately $600 per year or $50 per month for electricity. Based on a 10-year transition to market prices, residential consumers would see the monthly bill increase by $1.62 each year.

Chart 7: The Ten-Year Transition to Market Prices (cents/kWh)

	Current Price	Market Price (US$2 gas equivalent)	Market Price (US$3 gas equivalent)	Average Annual Growth Rate to Market Price (US$2 gas equivalent)	Average Annual Growth Rate to Market Price (US$3 gas equivalent)
Residential	6.11	7.18	8.39	1.62%	3.22%
Commercial	5.31	5.53	6.68	0.41%	2.33%
Industrial	3.40	4.42	5.62	2.65%	5.15%

Assumptions:

- *The current price is taken from BC Hydro.*
- *Market price is based upon the cost of gas in a combined-cycle gas turbine, which in turn determines the generation cost.*
- *BC Hydro's 2001 Fully Allocated Cost of Service Study is used to determine the transmission, distribution and customer service costs. Further, a 10-per-cent efficiency gain in transmission and distribution is assumed.*
- *No assumption has been made with respect to the implications of possible corporate restructuring, the potential for additional efficiencies or the fact that BC Hydro has not been earning a sufficient rate of return for transmission and distribution.*

Source: Energy Policy Task Force Working Group on Electricity.

As outlined in Chart 7, moving to market prices for electricity results in delivered price increases for consumers.

For residential consumers, the increase is from 6.11 cents/kWh to 8.39 cents/kWh over 10 years. This is an average annual rate increase of 3.22 per cent, assuming a gas price of US$3/MMBTU.

For commercial consumers, the increase is from 5.31 cents/kWh to 6.68 cents/kWh over 10 years. This is an average annual rate increase of 2.33 per cent, assuming a gas price of US$3/MMBTU.

For industrial consumers, the increase is from 3.40 cents/kWh to 5.62 cents/kWh over 10 years. This is an annual average rate increase of 5.15 per cent, again assuming a gas price of US$3/MMBTU.

For illustrative purposes, the electricity prices based on the lower gas price of US$2/MMBTU are also shown. Consumers would still face price increases, but average annual rates of growth would be much lower, ranging from 0.41 per cent to 2.65 per cent over 10 years.

To summarize, the following two pricing issues face the BC electricity sector:

- the growing price gap and therefore lack of fair competition among all energy sources; and
- the absence of good price signals and well-functioning wholesale markets to generate new sources of supply.

In British Columbia, while markets determine prices for natural gas and petroleum products, electricity rates are based on the blended cost of production.

Many BC industries, such as chemical, pulp and paper, and mining companies, are large users of energy. Therefore, their net income is greatly affected by energy price changes. As a result, any policy change that increases energy prices must be implemented carefully and over an extended period of time. This also holds true for British Columbians on fixed incomes.

The policy dilemma for British Columbia is to find a way to move to market prices, allowing consumers, particularly business and industry that are large electricity users, time to adjust, while at the same time encouraging investors to enter the market to ensure reliable electricity supply for the future.

Water Rentals

Currently, water rentals are charged for water use. More than 90 per cent of the charges, however, are for hydroelectric power production. In fiscal year 2000/01, water rental charges exceeded $300 million. The Task Force believes that the Province must develop a framework based on market principles to guide water rental policy.

THE NEED FOR REFORM

Introduction

British Columbia has not had a major addition to its electricity supply mix since 1984. As outlined earlier, this has contributed to a supply/demand balance for electricity that is increasingly difficult to sustain, with population and economic growth expected to strain the system even more in the years ahead. Of 18 new projects recently in service or coming onstream in the next few years, only one is based in British Columbia. (See Chart 8 for a summary of new and proposed thermal generation in the region.)

Population growth in British Columbia averages one per cent per year and that trend is expected to continue. In addition, energy use generally is going up, not down, with the average BC household more dependent on electrical appliances, television and sound systems and computers.

As noted, British Columbia is increasingly meeting its electricity needs through net imports from Alberta and Washington State. Last fiscal year, this net import figure stood at 1,700 GWh and it is expected to climb to approximately 6,000 GWh in 2001/02. Not only do net imports imply less self-reliance, they also demonstrate the immediate need for supply additions in the province. It is important to realize that these net imports come from electricity fuelled by a variety of energy sources, including coal and nuclear

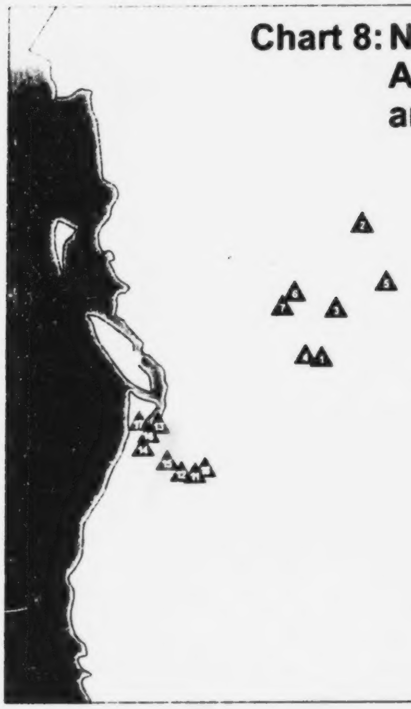


Chart 8: New Generation* to 2005 Alberta, British Columbia and the US Pacific Northwest

Alberta

2002 In-Service

▲ 1. Calgary (AES) - 525 MW
2. Muskeg River Mine (Shell) - 170 MW
3. Scotford Upgrader (Shell) - 150 MW

2003 In-Service

▲ 4. Calgary (Calpine) - 250 MW
5. Cold Lake (Imperial) - 170 MW

2005 In-Service (Coal)

▲ *6. Genesee (EPCOR) - 450 MW
*7. Keephills (TransAlta) - 450 MW

British Columbia and the US Pacific Northwest

2001 In-Service

8. Rathdrum - 270 MW
9. Klamath Falls - 484 MW
10. Elk Falls - 248 MW

2002 In-Service

▲ 11. Hermiston - 546 MW
12. Coyote Springs II - 286 MW
13. Fredrickson - 249 MW
14. Chehalis - 520 MW
15. Goldendale - 248 MW
16. Centralia - 248 MW

2003 In-Service

▲ 17. Satsop I - 532 MW

Received Regulatory Approvals for 2003 In-Service

▲ *18. Umatilla - 550 MW

*Projects have received regulatory approvals but have not commenced construction.
All projects are gas-fired except for two coal projects in Alberta.

Source: Energy Policy Task Force Working Group on Electricity

REFORM IN OTHER JURISDICTIONS

Electricity market reform has occurred in the United Kingdom, Scandinavia, New Zealand, Australia, Chile, Argentina and parts of the United States. In Canada, the provinces of Ontario and Alberta have undertaken reforms, introducing retail competition. Quebec, which has a large surplus of hydroelectricity, has opted to provide domestic customers with long-term supply contracts at below-market prices. Quebec's approach is at variance with the recommendations of this report.

Reasons for government reform of the electricity sector may include the following:

- to support a wider economic reform program (Alberta; Ontario; New Zealand; Australia; UK);
- to reduce prices for delivered electricity (California, UK, Ontario); or
- to conform with access rules in international and interconnected markets (Norway, Quebec, Northeastern US).

While there have been many successes in electricity reform, lack of planning, poor timing and a lack of regulatory foresight have led to difficulties in some jurisdictions.

Problems with electricity supply on Vancouver Island have already been outlined. This situation has reached critical levels as a result of long delays in project approval. Supply expansion for Vancouver Island requires immediate attention and options are limited.

Electricity-sector reform is occurring in many parts of the world. Reasons for reform may vary, but in British Columbia reform of the electricity sector is based on the two major factors outlined below. Each of them is significant in its own right. Taken together, they present a compelling case for comprehensive reform of the electricity sector in British Columbia.

We Need To Attract Private Capital

Constraints on Government

The Province of British Columbia, like most governments, has limited resources to fund major developments in energy or other sectors of the economy. Growing the energy sector is best suited to the private sector with its ability to access capital, manage development and take the associated risks. In order to attract private capital, the issues outlined below need to be addressed.

Need for Competition

If electricity markets are to grow and provide reliable and competitively priced energy for consumers, substantial private capital must be attracted. Private investors will participate if markets are accessible, with competitive prices, clear rules, transparent decision-making and opportunities for managing risk. If these conditions do not prevail, private investment will not be available for any aspect of generation, transmission and distribution – putting pressure on the government to be the sole investor. Increasingly, governments do not have the resources or the ability to manage risk.

Competitive markets provide the best price signals for investors and consumers, ensuring both the right supply/demand response and opportunities for greater conservation and energy efficiency. Ultimately, electricity must move to a price that reflects the costs of new resources. Current pricing is artificially low and based on the blended cost of providing a unit of electricity from current resources – without considering upgrades or the eventual replacement of the endowment assets. Still, a transition to full market prices for electricity must give consumers and industry time to adjust. However, without such reform there will be limited private-sector investment in British Columbia's electricity sector.

Lack of a Wholesale Market

Similar to the reform of natural gas markets, competition in electricity must start with a strong wholesale market supported by highly efficient transmission and distribution systems. Given experience in Australia and New

Zealand, the development of a well-functioning wholesale market should take about two years from the establishment of an independent transmission entity, provided the decision, once taken, is followed through to completion.

For wholesale markets to evolve, there must be many market participants including industrial customers. There must also be a means to manage demand and supply imbalances. Participants must have access to the transmission system to get electricity to market, as that market for British Columbia now includes a significant portion of Western North America with transmission linkages to the east as well as south.

The Importance of Transmission
Truly competitive wholesale electricity markets require open, unrestricted access to transmission facilities. While there is wholesale access to the transmission system of BC Hydro and UtiliCorp Networks Canada, it is perceived to be self-serving. To improve the functioning of the wholesale market, both real and perceived market power must be addressed.

Therefore, the first step in electricity market reform must be to establish an independent transmission company separate from generation and distribution entities. This would provide independent power producers access to the transmission system to move their electricity to market, which is now continental in nature. In many jurisdictions, this has also led to the break-up of vertically integrated (monopoly) utilities. In British Columbia, the move to a single, independent transmission company will require a significant restructuring of BC Hydro.

> "BC's practice of sheltering electricity consumers under a government-created rate regime of prices below market prices has discouraged energy efficiency."
>
> *Energy Probe Research Foundation (Toronto)*

A single transmission entity is the desired outcome and, as the majority of transmission assets are currently held by BC Hydro, the transition can be readily achieved. There are, however, two important factors that need to be addressed. The first is that the transmission system needs significant upgrading and expansion. For example, electricity transmission upgrades are required from Kamloops to the Lower Mainland and for the interconnection with Washington State. These two upgrades alone will cost approximately $450 million. Incentives will be required if private capital is to finance these upgrades. The second factor is that the transmission upgrading and expansion will require significant dialogue with communities and other stakeholders involved.

Good Market Signals and the Benefits for Conservation, Efficiency and Alternative Energy

The benefits of conservation and efficiency were discussed in Chapter 4. Conservation and efficiency are important components of energy policy and can play a key role in meeting our energy needs. However, without good market signals, the full benefits of conservation and efficiency cannot be realized.

The most important market signal is price and full market price provides consumers the best information for decision-making. At present, electricity prices in the province are based on blended costs, not market rates.

Increasing usage of alternative energy sources depends in part on their price competitiveness with conventional energy. As long as electricity is priced below market , there is little incentive for consumers to demand greater use of alternative energy. Once electricity reflects full market prices, however, the dynamic will change. Many BC consumers will support alternative sources if they are comparable in price to conventionally generated electricity.

As discussed earlier in the Report, alternative energy may take many forms, including fuel cells and wind power. Even with renewable hydroelectric power, there is a choice between a major project (Site C) on the Peace River of approximately 900 MW and numerous smaller projects. Good price signals will aid decision-making.

THE POLICY RESPONSE

Introduction

The first policy priority is to recognize that we must take immediate action to increase electricity supply. Our province-wide requirements need to be addressed now if domestic demand is to be met. The supply requirement on Vancouver Island is even more urgent. In addition, if British Columbia is to gain the economic benefits from exports of electricity, further supplies of electricity must be generated in the province.

The Ministry of Energy and Mines, the British Columbia Utilities Commission and BC Hydro (or its successors) have special roles to play in ensuring our electricity supply is adequate to meet demand. Collectively, they need to ensure that the market is well informed by good independent forecasting of what our electricity demands are likely to be. In addition, all potential supply and demand-side alternatives need to be considered in a timely manner. This means that all forms of alternative energy are considered along with all forms of conventional energy. Ultimate decisions on supply priorities need to be market-based. Moreover, we need a good understanding of the supply/demand profile for the entire regional electricity market in which we now operate. This means understanding electricity markets in Alberta and Washington State as well as our own

Develop a Competitive Market

As outlined earlier, competition starts with the development of a wholesale market in electricity. Such a market can be developed to protect the interests of BC consumers. There are many wholesale markets in electricity working well today including markets in Australia, New Zealand, Norway, Great Britain and the Eastern United States. These successes have received little publicity in British Columbia compared to the recent difficulties in Alberta and California. Even those experiences, however, can provide lessons on the pitfalls to be avoided.

Based on experiences in Alberta and California, the development of a wholesale market must avoid serious supply shortages. As a result, we must ensure that additional supply is readily at hand. Contrary to the experience in California, we must also provide good regulatory oversight in the interest of the consumer during the development period. California had neither ready supply (and therefore became import dependent) nor good regulatory oversight, which caused severe consequences for the consumer.

Based on the positive experiences of other jurisdictions, the Task Force believes the following key features are essential for a successful wholesale market:

- clear market governance based on defined market rules and appropriate market oversight;
- transparency and independence of market operations from generators, energy traders and distributors;
- open access to the transmission system (discussed in detail later);
- efficient price signals for energy, transmission and ancillary services. With respect to energy, these prices should reflect the value of energy at different locations within the province; and
- a pooling mechanism to manage fluctuations in supply and demand.

> "Alcan strongly supports the immediate establishment of an independent transmission entity."
>
> *Alcan Primary Metal Group*

The market features described above pertain to an efficient, wholesale market. Equally important is the development of a liquid financial market to allow market participants to manage the financial risks associated with the physical market. Fortunately, liquid bilateral contract markets already exist within the Western North American marketplace to manage risk.

Because private-sector investors have freedom to choose where they invest, British Columbia must develop a stable market with these features if it is to attract the capital it requires.

In addition, failure to send efficient price signals increases the risk that new investments in both transmission and generation will be delayed.

As noted, British Columbia has built a significant interrelationship with electricity markets in both Alberta and the United States. Accordingly, wholesale market development in British Columbia cannot be undertaken in isolation from developments in these jurisdictions.

While the actual operation of a wholesale market is beyond the scope of this Report, it will be a major component for policy implementation. Suffice it to say, that the wholesale market requires immediate attention in the context of regional issues. Further, relying strictly on bilateral arrangements will not reduce BC Hydro's influence nor will it encourage the generation of electricity by private companies.

> "... the separation of BC Hydro into separate components with an independent transmission entity makes real sense."
>
> *Canadian Electricity Association*

Transmission – A New Crown Corporation

In order to attract new players into the electricity sector, a regulated, separate and independent transmission entity must be established to manage transmission assets, ensure reliability and security of the power system, and operate the wholesale market. In addition, the transmission entity would be responsible for system planning and congestion identification and management.

As long as electricity transmission in the province is largely owned and operated by a single (monopoly) entity, continued regulatory oversight will be mandatory. Therefore, if this segment of BC Hydro's current business is separated out and combined – for operational purposes – with the transmission assets of other providers in the province it would be regulated by the BC Utilities Commission. The BC Utilities Commission would, among other responsibilities, approve and provide oversight on the rules governing open access, tariffs and returns for the transmission system.

The BC Utilities Commission would be involved in the design of the wholesale market operated by the transmission entity. It would also approve and oversee the rules of the market's operation.

The new transmission entity must be a commercial operation, charging fully for its services. Initially, the transmission entity should be a commercial Crown Corporation. At a later stage, it may be wise to consider some other form of governance, such as a non-share capital corporation, much like many airport authorities in Canada. Whatever the ultimate form, it must be fully independent. Without a modern transmission system that is both effective and efficient, a competitive market for electricity in British Columbia will not be realized.

Generation and Distribution

The separation of transmission from BC Hydro raises the question of further restructuring of BC Hydro. The Task Force is of the view that, along with transmission, generation and distribution are different businesses requiring different competencies. The Task Force further recommends that the provincial government restructure the rest of BC Hydro into at least two legally separate, distinct and independent entities handling generation and distribution. Generation involves the development, operation and management of large production assets. Distribution deals with acquisition and delivery of electricity to individual customers and involves connections, service, call-centres and account management. From a competence standpoint, not only are the required skills, knowledge, technology and processes different, so too are the focus, business strategy development and performance measures.

A number of different models exist for these new enterprises. All have the aim of creating businesses that are structured and operated like privately held businesses, earning an appropriate rate of return on capital employed, paying full taxes and relying on their own credit rating, not that of government. The creation of commercial Crown Corporations in the electricity sector has been undertaken in a number of different countries and in several Canadian provinces. Consequently, there is worldwide experience to guide successful development in British Columbia.

Generation

Core and non-core assets can be divided into two separate companies. The core assets include the endowment assets on the two-river system and Burrard Thermal. The non-core assets include small hydro and other thermal facilities (see Chart 2). There would be two Crown-owned generation companies, one with the core assets and one with the non-core assets. The latter Crown Corporation would exist for a limited period of time, remaining only until the government directs the disposition of these non-core assets.

The Task Force recommends that, over time, the permanent Crown-owned generation company should be subject to the same rules and practices that apply to private companies. This would include the opportunity to pursue competitive market opportunities and the ability to own and operate assets both within and outside British Columbia. In the transitional period leading to the development of a well-functioning wholesale market, however, some restrictions should apply. In particular, for the next several years new electricity supply should be developed by private-sector companies and not the Crown-owned generation company. This will reduce the market power of the Crown-owned generation company and encourage new private market participants.

> "The BC Business Council concurs with the Task Force's recommendation that BC Hydro be split into three distinct operating entities."
>
> *BC Business Council*

Since the Crown-owned generation company would have the endowment assets, i.e. the hydro generation plants on the Peace and Columbia Rivers, special contractual and oversight arrangements with the government would be required. The BC Utilities Commission would be involved in the allocation of the endowment among customers. Some form of regulatory oversight of the new Crown Corporation may also be necessary, at least until a well-functioning wholesale market is developed.

> "…all customers should be exposed to market pricing. The endowment assets should benefit all customers and be paid via a rebate…."
>
> *Coral Energy Canada Inc.*

Distribution

The Task Force recommends that four geographically determined distribution utilities be created: Vancouver Island, the Lower Mainland, the Interior/Columbia and the North. The distribution entities should be separate, regulated entities, operating on commercial principles. The reason for four distribution utilities is as follows:

- there is a need to meet regional needs with regional preferences, supported by rate design;
- experience elsewhere suggests that large distribution companies are often slow to respond to regional differences;
- smaller distribution utilities can still use shared services and therefore capture economies of scale; and
- several buyers of electricity enhance the evolution of a competitive market.

While the Task Force recognizes that distribution could be handled by a single entity with four operational units, this is not recommended – for the reasons stated above. Based on local strengths and preferences, various regions may choose to solve their electricity needs differently, and this should be encouraged.

It should be noted that electricity distribution companies would carry specific management responsibility for portfolio standards as outlined in Chapter 4. They would also have responsibility for innovative rate design -- approved by the BC Utilities Commission - to encourage conservation and energy efficiency

The government must make a decision on the ownership structure of the distribution entity or entities.

Move to Market Prices Over Time to Facilitate Adjustment for Consumers

Given the need to move to market prices for all electricity – including electricity generated by the endowment assets – there are several pricing issues that warrant attention. The length of time required to move to market prices is the prime issue. Another is the dividend on endowment assets and, assuming it is positive, who should retain that portion of the dividend not returned directly to consumers. Finally there is the importance of price certainty during the transition to market rates.

In addressing the price issues above, the Task Force considered the following factors:

- the economic impact on consumers;
- the need to protect consumers from excessive volatility;
- the need to include all consumers in transitional arrangements;
- the need to send strong price signals to bring about appropriate supply responses and additional conservation and economic efficiency;
- the importance of certainty and simplicity; and
- the need for a robust wholesale market.

The changes required to move various customer classes to full market pricing for electricity were outlined in Chart 7.

The Task Force received a number of submissions against moving to market prices from large industrial users who consider the endowment more of a right and one of the few cost advantages British Columbia offers. On the other hand, independent power producers and others are looking for market signals now, and therefore support a move to full market prices as soon as possible. Therefore, suggested times to move to market prices ranged from immediate to 99 years.

THE ENDOWMENT AND MARKET PRICES

The endowment assets on the Peace and Columbia Rivers will continue to provide benefits to British Columbians. With rebates, the effective price of electricity will remain below market prices during the 10-year transition period. As a result, British Columbians will see a blended price of electricity.

The Task Force recommendations call for blended electricity prices for 10 years in order to allow industry and other consumers to adjust to full market prices while at the same time encouraging private investment in new sources of electricity supply. Full market prices do not need to be reached immediately but will be required eventually if both consumers and investors are to get the right price signals. Doing so over 10 years is both prudent and realistic.

During the 10-year transition to full market prices and for that matter, beyond, distribution companies, with BC Utilities Commission oversight, will be managing exposure to daily prices to ensure BC consumers are protected from market uncertainties and undue risk.

An immediate move to full market prices for electricity is neither practical nor wise; the increase required is simply too large, particularly for those energy users that rely on electricity as a major production input. As a result, the Task Force recommends a 10-year time frame for adjustment. This adjustment period falls within a longer corporate planning cycle, but is still sufficiently close at hand to give the market clear signals.

> "…ensure that changes in electricity policy are carefully aligned with other policy initiatives aimed at establishing a more competitive environment for particular industries…."
>
> *BC Business Council*

As early as possible, the Task Force recommends that all electricity distribution companies reflect full market prices in energy bills to consumers. Rebates arising from the endowment asset dividend should also be shown as long as the full market price is clearly evident.

To start the process of price adjustment, the Task Force recommends that the BC Hydro rate freeze be terminated as of January 1, 2003. Annual rate adjustments of at least three per cent for each of the next three years should be put in place allowing seven years for the rest of the adjustment. Consideration might also be given to having an interim rate adjustment earlier than January 1, 2003. These rate increases will be required for cost of service and infrastructure enhancement and partial funding for the foundation recommended in Chapter 4.

In addition, the BC Utilities Commission should play a direct role in rate-increase determination, recognizing operating and capital needs of the electricity system and the long-term objective to move to full market prices. In doing so, the BCUC should provide as much price certainty as possible. The BCUC should also take into account other significant policies underway. This latter consideration is critical. For example, the BC forest sector is undergoing a major transformation; significant policy changes are expected in the near term. Therefore, this sector and possibly others should experience a move to market prices for electricity at the time these other policy changes are implemented, and not before.

In its Interim Report, the Task Force indentified three mechanisms for adjustment to market prices: a constant volume mechanism, a constant price mechanism and a rebate mechanism. The Task Force now recommends that rebates be provided through the billing system. Rebates send clear messages about real costs, are simple to administer and thereby provide the best means to handle the dividend on the endowment.

In moving to market prices, the Task Force recommends the government take the following complementary policy action:

- remove the Provincial Sales Tax on energy inputs for industry – a tax policy unique to British Columbia;
- provide accelerated write-offs for investment in energy-saving technology; and
- provide rate design incentives to promote energy efficiency by all consumers.

That portion of the endowment dividend not returned to consumers should be directed to government. The endowment assets were built by the government of the day, on behalf of the people of the province. Therefore, government should determine the future use of the dividend not returned directly to electricity consumers.

Possible uses for the dividend may include energy investments or other good public policy investments. They should include an ongoing investment in the foundation outlined in Chapter 4 of this Report.

Efficiencies

Efficiencies in the electricity sector can be captured in a variety of ways. Demand-side management should play a direct role. These efficiencies represent real value and, if captured wisely, represent the value of significant new additions to supply.

As outlined earlier, one of the best ways to ensure that energy consumers capture efficiencies is to move electricity pricing to full market. In this way, consumers make better economic decisions and trade-offs.

Regulation

The BC Utilities Commission will be moving to results and performance-based regulation. This will be welcomed by the energy industry if done quickly. Moreover, it will provide the right signals to energy investors.

As the BC electricity sector is reformed, however, the BC Utilities Commission will have to play a significant oversight role. Its ability to perform well in this regard will greatly influence the pace and success of electricity reform in the province. Some of the oversight responsibilities for the BC Utilities Commission should include the following:

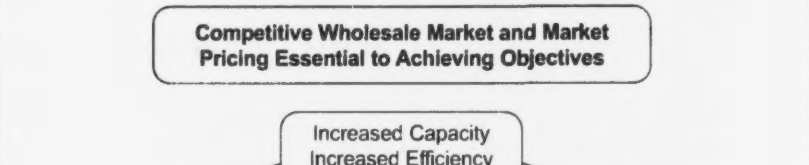
- independent forecasts of supply/demand;
- the allocation of the endowment dividend to various distribution companies and, in turn, to various consumer classes as part of the rate-design process;
- the move to full market prices and the use of consumer rebates;
- the new transmission entity and its regulatory framework;
- wholesale market design and operation; and
- the performance of distribution companies including incentives to increase energy efficiency.

There is a clear need for the BC Utilities Commission to work closely with its counterparts in Alberta, the Western US and the Federal Energy Regulatory Commission. The BC Utilities Commission should take the lead in developing the province's linkages with other regulatory agencies if British Columbia's interests are to be protected and advanced.

There is also a need for the BC Utilities Commission and the National Energy Board to harmonize activity wherever possible. For example, the National Energy Board regulates interprovincial and international power lines, including authorization and permitting of electricity exports. The Province issues Energy Removal Certificates to entities that wish to export electricity produced in British Columbia. These certificates provide little additional information. In addition, current requirements can cause delays and regulatory uncertainty. This process needs to be streamlined.

There is also a need for the BC Utilities Commission to work closely with the BC Oil and Gas Commission and the provincial Environmental Assessment Office, the latter to harmonize federal and provincial reviews of major projects through one process. To date, harmonization has not been achieved. This issue is discussed in greater detail in Chapter 8.

Chart 9: Benefits of Electricity Reform


Competitive Wholesale Market and Market Pricing Essential to Achieving Objectives
Increased Capacity
Increased Efficiency
More Supply Diversity
Conservation and Energy Efficiency
More Alternative Energy
New Investment
More Competition
Foundation
Competitive Wholesale Market
Open Transmission
Endowment Dividend
Market Pricing
BC Hydro Restructuring
Transition Rebates

Source Energy Policy Task Force

Alternative Energy and the Environment

The Task Force spent considerable time addressing alternative energy options and environmental priorities of the province, recognizing the changing world energy market. Though conventional energy still dominates North America's required energy supply and is likely to do so for some time, in the long term there will be less reliance on fossil fuels and greater use of alternative energy.

For most jurisdictions, including British Columbia, the competitive advantage for alternative energy will come from technologies that support its use and the subsequent opportunities to market these technologies. This is precisely what is happening with the development of the fuel cell industry in British Columbia today. The fuel cell is gaining greater domestic use, at least in pilot projects, while the industry is selling the technology worldwide, with associated job and income benefits for British Columbians.

With the dual objective of greater alternative energy use and the benefits of technology transfer, the Task Force strongly recommends expanding research and development for alternative energy and using portfolio standards for distribution companies (as discussed in Chapter 4). The Task Force also recommends that some portion of the endowment dividend be used by the foundation to develop alternative energy, recognizing the need for the market – not government – to determine which forms of alternative energy ultimately prove viable.

IMPLEMENTATION

Good policy is only effective if implemented well. The reform of the BC electricity sector is a major undertaking that will require careful planning and design and independent decision-making guided by clear policy direction from government.

The process can begin almost immediately. A 10-year time frame is proposed to move to market prices on electricity. However, predictable rate increases in each of the next 3 years, should provide investors and consumers a degree of certainty. The restructuring of BC Hydro could take place over the next several months. Regional policy will directly influence the rate of wholesale market development. Nonetheless, a wholesale market must be fully operational within 3 years.

Success in electricity reform elsewhere will serve as a useful guide. The Task Force is mindful of the problems experienced in Alberta and California and recognizes there will be challenges of both a transitional and permanent nature. However, the rewards in meeting these challenges will be significant. Most importantly, these rewards will flow to the BC consumer and can be summarized as follows:

- electricity supply will be reliable and secure, something not all jurisdictions enjoy and something British Columbia will not have unless the electricity sector is reformed;
- electricity prices will be market-based and therefore competitive with other sources of energy and with electricity prices in other jurisdictions;
- electricity generation will serve domestic and export markets, bringing jobs and income benefits to British Columbians; and
- electricity will be generated by a range of energy sources, and these sources will include increasing amounts of alternative energy.

The benefits of electricity reform are interconnected, as shown in Chart 9.

RECOMMENDATIONS

The Task Force recommends the Province or agency responsible take the action outlined below.

5.01 Develop a wholesale electricity market based on open access to the electricity transmission system. The development of this market must be consistent with market developments in Alberta and the US Pacific Northwest.

5.02 Establish an independent transmission entity as a Crown Corporation clearly separate from all generators, distribution utilities and retailers. All transmission in the province needs to be coordinated by that entity. The entity would be regulated and would:

- manage transmission assets;
- ensure reliability and security of the system;
- administer a wholesale market; and
- schedule and balance the transmission system.

The establishment of an independent transmission entity will necessitate the restructuring of BC Hydro.

5.03 Restructure BC Hydro. A new Crown Corporation responsible solely for generation from the endowment assets and Burrard Thermal needs to be established. In addition, four separate regional distribution utilities need to be established. Non-core assets need to be handled in a separate entity.

5.04 Establish Crown-owned entities on a commercial basis to resemble comparable, non-government-owned commercial enterprises.

5.05 Encourage private-sector investment in additional electricity generation in the province. This generation needs to be for both domestic and export markets.

5.06 Recognize Burrard Thermal as integral to British Columbia's electrical system. Burrard Thermal can be upgraded or replaced, the latter requiring lead time and significant financial resources.

5.07 Recognize Williston Reservoir's direct and valuable role in supporting electricity generation on the Peace River. The current water license for the Williston Reservoir should be respected

5.08 Establish 10-year transitional arrangements for the market pricing of generation from the Columbia and Peace River dams, referred to as the endowment, and ensure all customers receive a fair share of the endowment through a rebate. The remaining rebate is to be government revenue with a portion directed to the foundation on Conservation, Efficiency and Alternative Energy.

The Province also needs to take the following complementary policy action:

- remove the Provincial Sales Tax on energy inputs for industry, a tax policy unique to British Columbia;
- provide accelerated write-offs for investment in energy-saving technology; and
- provide rate design incentives to promote energy efficiency by all consumers.

5.09 Eliminate the electricity rate freeze on January 1, 2003, or sooner, and institute at least a three per cent per annum rate increase for three years to provide funding for electricity infrastructure upgrades and expansion, cost of service and the foundation.

5.10 Ensure the move to market pricing is fully coordinated with other major policy changes underway. This is particularly important in the forest sector.

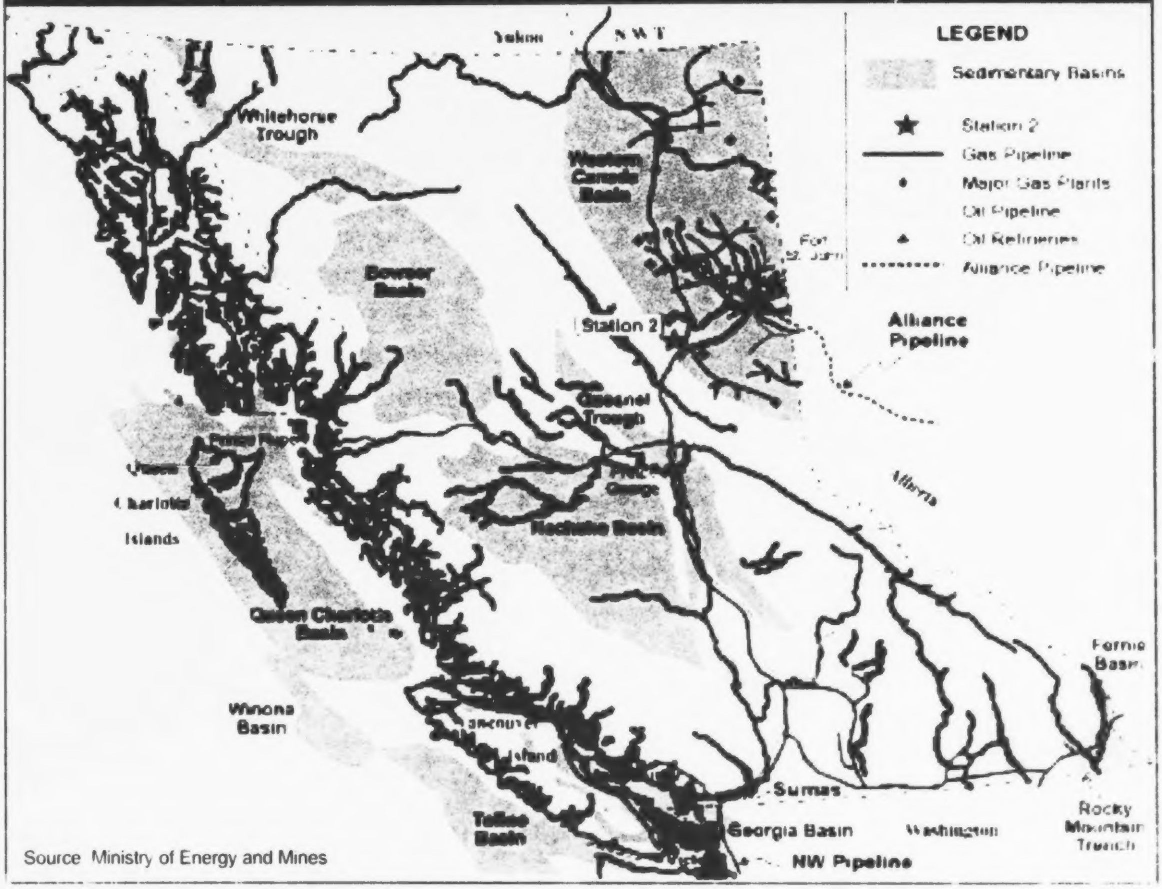
5.11 Ensure distribution companies send strong price signals to consumers by reflecting full market prices in electricity bills.

CHAPTER • 6
OIL AND NATURAL GAS

INTRODUCTION

British Columbia is blessed with an abundance of hydrocarbon resources, including huge reserves of natural gas, coalbed methane and oil that have yet to be discovered. (See Charts 10 and 11.)

Chart 10: Oil and Natural Gas in BC


Yukon
N.W.T.
LEGEND
Sedimentary Basins
★ Station 2
Gas Pipeline
• Major Gas Plants
Oil Pipeline
▲ Oil Refineries
Alliance Pipeline
Whitehorse Trough
Western Canada Basin
Fort St. John
Bowser Basin
Station 2
Alliance Pipeline
Quesnel Trough
Prince Rupert
Queen Charlotte Islands
Prince George
Nechako Basin
Alberta
Queen Charlotte Basin
Winona Basin
Vancouver Island
Fernie Basin
Sumas
Tofino Basin
Georgia Basin
Washington
Rocky Mountain Trench
NW Pipeline

Source Ministry of Energy and Mines

Between January and December 2001, the province sold a record $439 million of oil and natural gas rights, and record levels of drilling activity took place. The sales value of British Columbia's oil and natural gas production in 2001 exceeded $5 billion, and investment was close to $2.7 billion. Further, about 14,500 people were directly employed in oil and natural gas production, and an additional 23,000 jobs were indirectly linked.

Oil and natural gas revenues account for approximately eight per cent of total government revenues (Consolidated Revenue Fund) and form the largest source of natural resource revenues. Revenues to the province exceeded $1.8 billion in fiscal year 2000/01, with approximately $1.3 billion from natural gas royalties. While much of the recent growth can be attributed to abnormally high natural gas prices last winter, a future combination of moderately high prices and increased production volumes could result in these revenue levels being exceeded.

Although oil production remains an important part of the industry in British Columbia, natural gas is by far the dominant product, accounting for 90 per cent of current drilling activity and revenues. Currently, British Columbia produces more than twice the volume of natural gas it consumes. Consequently, this chapter focuses on natural gas issues.

Current natural gas production comes from an extension of the Western Canada Sedimentary Basin (WCSB) into Northeast British Columbia (east of the Rocky Mountains). At the present rate of production, these resources (both established and undiscovered) could last another 40-50 years, assuming continued exploration and development. In addition, there are other unexplored sedimentary basins as well as significant potential for coalbed methane development as well. Chart 11 outlines the undiscovered resource potential of the province.

Chart 11: Onshore Sedimentary Basins in British Columbia
(Undiscovered Resource Potential)

Basin Name	Gas (Tcf)[3]	Oil (billion barrels)	Coalbed Methane[4] (Tcf)
Explored Basins			
Western Canada Sedimentary Basin[1]	50.0	0.8	60.0
Fernie[1]	0.4	0.01	19.0
Unexplored Basins			
Whitehorse/Bowser[2]	8.3	2.5	8.0
Quesnel/Nechako[2]	9.5	5.1	1.0
Georgia/Vancouver Island[2]	6.5	0	1.0

1 Western Canada Sedimentary and Fernie Basins have a history of exploration and production. Resource estimates based on National Energy Board assessments.

2 W/B, Q/N and G/VI Basins have had little or no exploration or production, but have the geological conditions which indicate the presence of hydrocarbons. Estimates from Geological Survey of Canada.

3 Figures represent estimates of total raw gas in place. The contribution to future gas supply from remaining reserves and undiscovered gas resources of the WCSB is estimated to amount to 38 Tcf of marketable gas. The difference is attributed to recovery factors and fuel usage.

4 No coalbed methane has yet been produced in commercial quantities anywhere in BC.

Source: Ministry of Energy and Mines.

As it is relatively underexplored, the British Columbia portion of the Western Canada Sedimentary Basin holds great potential for large discoveries, as indicated by the following:

- recent discoveries such as Ladyfern, the largest Canadian discovery since 1986;
- reserves per well are four times higher in British Columbia than in Alberta;
- initial production rates are more than twice those of Alberta; and
- since January 2000, many of the wells drilled produce more than 5 million cubic feet per day.

NATURAL GAS TRANSMISSION SYSTEMS IN BC

Approximately 18,000 km of gas-gathering and transmission lines are now used in British Columbia. The largest is the Westcoast Energy system which connects the Northwest Territories, Alberta and Northeast British Columbia with Vancouver and the US Pacific Northwest, and provides the principal link between production and market.

There are several other transmission pipelines, most notably the Alliance Pipeline which delivers gas to the US Midwest. Gas is processed at 27 plants in Northeast British Columbia, many of which recover sulphur and liquid by-products (propane and butanes). The major gas plants are located at Taylor, Fort Nelson and Pine River near Chetwynd.

Transmission systems located totally within the province are regulated by the BC Utilities Commission (BCUC). Interprovincial and international transmission systems are regulated by the National Energy Board (NEB). The Westcoast gathering and processing system is also regulated by the NEB as a result of its connection to the Westcoast transmission system.

Regulated by the BCUC, natural gas distribution in the province is provided through investor-owned utilities such as BC Gas, Pacific Northern Gas and Centra Gas. Large industrial and commercial customers can contract for natural gas directly from producers or marketers, while smaller consumers must purchase directly from the utility.

The majority of consumers of BC-produced gas are located at "the end of the pipe" in Vancouver and the market areas of Seattle and Portland. These markets, while regionally significant, are small in comparison to the US Midwest, California and the East Coast.

Unlike electricity, natural gas markets have been deregulated since 1985. We now have an interconnected North American market with little government intervention. There is an active wholesale market with two market trading centres in British Columbia, one at Station 2 near Fort St. John, and the other at Sumas (see Chart 10). All major pipelines provide open access, with incentive-based economic regulation. In response to demand, several pipeline expansions are being proposed.

COALBED METHANE

Coalbed methane (CBM) is the natural gas found in most coal deposits. CBM is created through a process by which plant material is converted into coal over millions of years. Under most circumstances, CBM consists of pure methane. Commercially produced coalbed methane can be distributed by the existing natural gas distribution system and used for heating homes and businesses.

Commercial coalbed methane production grew quickly in the United States during the 1980s as a result of tax incentives to develop new domestic fuel sources. Today, coalbed methane accounts for approximately seven per cent of total annual US natural gas production. Coalbed methane is not commercially produced in Canada, although several jurisdictions are exploring the development of this resource.

Coalbed methane offers significant economic opportunities in British Columbia. There is an estimated 90 trillion cubic feet of the resource in the province. Areas with a high potential for coalbed methane include the Peace River in the Northeast, the Fernie-Elk Valley area in the Southeast, Vancouver Island and several Interior coalfields.

Seven experimental projects are underway across the province – five in the Northeast and one in the southeast near Fernie. A project on Vancouver Island has commenced drilling. Commercial coalbed methane production in British Columbia could begin within the next year.

As part of the provincial budget of February 19, 2002, the Province introduced a royalty regime specific to coalbed methane development. In addition, the Ministry of Energy and Mines and the BC Oil and Gas Commission are developing regulatory requirements appropriate for this new resource opportunity.

ISSUES AND POLICY RESPONSE

Despite rapid expansion in the natural gas industry and the huge unexplored potential, British Columbia has not realized its share of investment and resource development. For example, while British Columbia holds 17 per cent of the reserves within the Western Canada Sedimentary Basin, the province produces only 12 per cent of the total production and is the location for only 6 per cent of the number of wells drilled. Also, British Columbia currently produces no coalbed methane.

There are a variety of reasons why the rate of development in British Columbia lags behind its potential. Several factors are outlined in the discussion that follows.

Infrastructure:

Storage

Natural gas storage is used throughout North America as an essential tool to reduce price volatility and ensure reliable supply to major market areas, particularly during seasonal periods of peak demand. The reasons for this are as follows:

- natural gas storage gives buyers and sellers the ability to buy or sell at peak or off-peak times. For example, a gas utility may want to purchase gas during the summer (when prices are typically lower) and store this gas until winter. This helps the utility avoid paying high prices during peak demand periods;
- a natural gas storage facility located near major markets ensures a secure, reliable supply of natural gas, avoiding the effects of pipeline disruptions or constraints;
- during times of high demand, there is less dependence on the natural gas pipeline transmission system, thereby keeping the costs of expensive pipeline expansion down and ensuring a high degree of reliability; and
- storage is beneficial to the producing industry as it allows constant production rates, even during periods of low demand.

The Lower Mainland is one of the only major markets in North America that does not have sufficient natural gas storage. Regional storage is available in southwest Washington (Jackson Prairie) and near Portland, Oregon (Mist).

The Jackson Prairie natural gas storage facility in southwest Washington is one of 415 underground natural gas storage sites in North America with a usable storage capacity of 18 billion cubic feet. A natural aquifer, its porous sandstone is overlaid with an impermeable cap rock and sealed on the edges by underground water. Jackson Prairie can store enough gas to heat 1 million western Washington homes through a month of cold winter weather and supply about 40 per cent of Puget Sound Energy's peak day requirements.

BC Gas leases space in the Jackson Prairie storage field and is entitled to peak day deliverability of approximately 110 million cubic feet per day, about 10 per cent of its peak day requirements.

Jackson Prairie storage does not provide the benefits that would be received from having storage in or near the Lower Mainland. There are access, shipping cost and potential pipeline constraint issues associated with such remote storage.

NATURAL GAS STORAGE

Unlike oil, which can be transported and stored in any number of low-pressure mobile vessels including tanks, trains, trucks and ships, the storage of natural gas must take place under pressurized conditions in relatively immobile facilities such as pipelines. The following outlines the four principal types of storage facilities used in North America today:

- depleted oil or gas reservoirs;
- aquifers (with structural closure to prevent gas from escaping);
- salt-cavern formations; and
- above-ground manufactured vessels that store natural gas in an extremely cold liquid state.

The first three types utilize geologic features that must be discovered through exploration and then assessed for their ability to safely store natural gas. Depleted oil or gas reservoirs are ideal as they have a proven ability to store gas over millions of years – from the time of their formation to their discovery and production. Above-ground facilities can be manufactured and located anywhere with access to a pipeline.

Each type of storage has its own physical and economic characteristics that determine its suitability. The following are four of the most important characteristics:

- location - proximity to consuming areas and proximity to producing areas;
- capacity - the capability to hold natural gas for future use;
- deliverability - the rate at which gas inventory can be withdrawn; and
- recharge rate - the rate at which the facility can be refilled.

Generally, geologic features have high capacity and moderate to high deliverability and recharge rates. However, these sites cannot simply be selected, but in fact, must be discovered. In use, they consume energy to pressurize gas from surface pressures to the ambient pressures in the underground formation. Manufactured facilities can be located anywhere, but they have low capacity and very slow recharge rates. They consume energy to chill natural gas into its liquid state.

BC Gas operates the only natural gas storage facility in the Lower Mainland, an above-ground facility on Tilbury Island. At peak deliverability rates, this facility can be depleted in just four days, yet recharging takes 120 days.

Several unsuccessful attempts have been made to develop natural gas storage facilities in or near the Lower Mainland. Environmental, health and safety issues have been the main concerns raised at the local level for both underground and above-ground storage. There has been little public education on why such storage is critical.

Nor has there been a good understanding of how successful other jurisdictions have been in providing safe storage. It is time to address these issues.

> "British Columbia has an unprecedented opportunity to become a supplier of choice within the continental energy market."
>
> *Canadian Association of Petroleum Producers*

Pipelines

Historically, British Columbia's natural gas production has either been consumed domestically or exported to the US Pacific Northwest, typically western Washington and Oregon.

Natural gas consumed in the Lower Mainland and in much of the Interior is transmitted from the Northeast via the major transmission pipeline owned by Westcoast Energy. This pipeline originates in Fort Nelson, connects to several BC distribution systems and terminates near Abbotsford where it connects to pipelines delivering gas to the United States through Sumas.

The demand for natural gas increased dramatically in the 1990s throughout North America and is forecast to increase over the next two decades. The primary growth area is expected to be natural gas-fired electricity generation (see Chart 8).

In response to increasing demand, two new major natural gas transmission pipelines have been constructed recently in British Columbia. The Alliance Pipeline, which came into service in 2000, transports British Columbia-sourced natural gas to Chicago for consumption in US Midwest markets. The Southern Crossing Pipeline (SCP) receives Alberta-sourced natural gas and delivers it to the Interior for domestic consumption. Both Westcoast Energy and BC Gas have announced plans to increase their natural gas transmission pipeline capacity into the Lower Mainland by 2003 and 2004 respectively.

Recent pipeline construction and planned expansions provide evidence that the market is working. However, under some conditions the market can be slow to respond. The nature of pipeline construction and expansion involves considerable delays between the market signals to expand capacity and new capacity to deliver gas.

Historically, pipeline companies were prepared to absorb a certain amount of risk associated with pipeline expansion, and capacity was increased so that there was always a slight excess of capacity over demand. Pipeline companies now expand pipeline capacity only after capacity increases are contracted. This results in a risk of pipeline adequacy being shifted to consumers, particularly given the lag between the signal to expand capacity and the increased capacity becoming a reality. Recognizing that the risk should be on investors and not consumers, clear and early signals need to be sent to the market on the need for pipeline expansion.

Roads

Northeast British Columbia is a vast area with sparse and poor-quality road infrastructure. Few roads are paved, and the region has historically received little in the way of infrastructure and maintenance funding. Typically, public roads have been constructed for the agriculture industry. Due to the scarcity of good road construction materials, i.e. gravel, these roads are generally made of dirt and clay and cannot withstand the heavy loads of oil-and-gas-industry traffic. Road bans are routinely imposed on public roads, effectively shutting down the industry each spring.

In 1998, $103 million was allocated to rehabilitate public roads used extensively by the oil and gas industry in the region. Funding was based on a cost/benefit analysis which estimated a 5:1 return on expenditures, predicated on a longer drilling season associated with reduced road bans as well as efficiencies gained from improvements. Already, returns have been demonstrated in the form of increased land sales, summer drilling programs and construction of private-sector road infrastructure located off improved public roads.

Greater priority needs to be given to road infrastructure. Meeting this challenge will require new forms of public-private partnerships.

Access

The natural gas industry cannot explore and develop resources without physical access to the land. This requires land-use planning that is comprehensive, timely and certain. Without access to sparsely developed, high-potential areas, e.g., the Muskwa-Kechika Management Area, industry growth will be constrained by diminishing opportunities. Access for oil and gas development in regions not historically associated with the industry (e.g. coalbed methane on Vancouver Island, and conventional resources in Interior basins) will also be necessary if those resources are to be developed.

In addition to the physical barriers to new resources, the lack of good information is also a problem. Although the resource potential of the Interior basins is large, there is little geologic information readily available to potential investors. This is also true for coalbed methane. Combining existing data with new studies on selected opportunities would help to narrow the focus and increase the attractiveness of these resources for investors.

Royalty Regime

Natural gas royalty rates in British Columbia are sensitive to gas prices within certain ranges. The system is similar to that of Alberta. In most cases, however, British Columbia's royalty rates are lower. Rates in British Columbia vary from 9 to 27 per cent, but have recently been at the top of the range due to high prices.

NORTHERN NATURAL GAS PIPELINE

The Mackenzie River Delta in the Northwest Territories (NWT) and the Alaska North Slope have combined totals of 45 trillion cubic feet (tcf) of proven reserves and 155 tcf of potential reserves.

The US demand for natural gas is forecast to grow from 65 billion cubic feet per day (bcf/d) to 76 bcf/d by 2010. Canadian demand is forecast to grow from 8 bcf/d to 10 bcf/d in 2010. This forecast has renewed interest in building one or more pipelines to transport Arctic gas to market. The following three pipeline route options have been identified and are at varying stages of consideration:

- Mackenzie Valley Pipeline – to transport Mackenzie Delta sourced natural gas south along the Mackenzie Valley to tie into the existing pipeline system in northern Alberta;
- Alaska Highway Pipeline – to transport Alaska North Slope natural gas south to Fairbanks, Alaska, then following the Alaska Highway through Northeast British Columbia and then either tying into the existing pipeline system in northwest Alberta or continuing with a new pipeline into the US Midwest; and
- Beaufort Sea/Mackenzie Valley Pipeline, known as the Over-the-Top route – to transport Alaska North Slope natural gas via an offshore, subsea pipeline to the Mackenzie Delta, and from there transport both Alaska North Slope and Mackenzie Delta natural gas south along the Mackenzie Valley, either tying into the existing pipeline system in northern Alberta or continuing with a new pipeline into the US Midwest.

The Mackenzie Delta Producers Group – Imperial Oil, Conoco, Shell and ExxonMobil – have indicated their intention to proceed with development of a proposal to construct a Mackenzie Valley Pipeline to transport one bcf/d of natural gas into Northern Alberta, estimated to be in-service by 2008/10.

To date, the Alaska Gas Producers – ExxonMobil, British Petroleum, and Phillips – have spent a year and US$100 million studying the Alaska Highway and Over-the-Top options. In December 2001 several Canadian and US-based pipeline companies submitted a joint proposal for a smaller capacity, lower cost Alaska Highway Pipeline.

The construction of northern gas pipelines from Alaska through British Columbia could result in significant economic development for the province. The federal government is committed by legislation to consult with affected provinces. British Columbia will work with the federal government and pipeline proponents to facilitate passage of the pipeline through BC, and ensure that the province maximizes the benefits of such a development. The obvious benefits include employment and machinery purchase and repair, both during construction of the pipeline and throughout its operation. The province will realize even greater benefits if the northern pipeline interconnects with the existing transmission system in Northeast British Columbia. This would significantly enhance the Northeast gas market hub around Station 2. The province's natural gas liquids extraction industry would also benefit if it can access liquids from the northern pipeline gas stream.

The royalty structure remained virtually unchanged from 1990 to 1998, when a new regime with greater price sensitivity but lower minimum rates was imposed for new wells.

Since 1998, several other royalty changes have been made. These include a heavy-oil royalty regime and a low-productivity royalty rate discount. These royalty reductions have been successful, increasing activity and prolonging the life of wells. A royalty regime for coalbed methane was implemented in the budget of February 2002, and the development of a tight-gas royalty regime has been requested.

Environmental Priorities:

Flaring

In Alberta, where the oil and gas industry is much larger and more widespread, natural-gas flaring has become a major public policy issue. The primary concern is the potential impact on animal and human health from flaring of sour gas.

There are three primary reasons for flaring: well testing, emergencies and economics. For the first two, flaring is short-term in nature, i.e. a few minutes to a few days, and is an integral part of developing and producing natural gas. The public policy issue around test flaring is the environmental impact on surrounding vegetation and generally on air quality. Emergency flaring is unavoidable, intermittent and of short duration, therefore it is not a major public policy issue.

Ongoing flaring due to the low volume of natural gas produced in association with oil is the primary reason for the public concern over flaring. This problem exists in many Alberta communities. To reduce flaring, the Alberta government has implemented a royalty waiver on "otherwise flared gas."

Flaring of associated gas is not as widespread in British Columbia as it is in Alberta. Nevertheless, it has become a public policy issue, particularly in the area north of Fort St. John. The BC Oil and Gas Commission has allocated a portion of its Environment Fund to develop a flaring standard that would reduce impacts on people and the environment.

Waste-Gas Disposal

As gas production moves into the foothills of the Rocky Mountains, there will be an increasing trend toward sour-gas production, i.e. natural gas with significant concentrations of hydrogen sulphide. Traditional processing methods at gas plants strip the hydrogen sulphide from the gas stream and recover elemental sulphur as a by-product. A small portion of the sulphur remains unrecoverable and is incinerated and released to the atmosphere along with carbon dioxide. Due to public health and air-quality concerns, regulations have become increasingly stringent for sulphur-recovery levels resulting in significantly higher processing costs.

There is currently a world oversupply of sulphur, resulting in a lower value than the cost of recovery. Rather than shipping sulphur to oversupplied markets at a loss it is often stockpiled at its production site. This, in itself, raises public policy issues.

An alternative method for dealing with sour gas and sulphur production has been to re-inject the sour gas into depleted reservoirs for permanent disposal. This method reduces greenhouse-gas emissions and avoids additional sulphur stockpiling. As the technology develops, it may also generate cost-savings. For example, injection of carbon dioxide into coal is known to enhance coalbed methane recovery. There is currently a major project underway in British Columbia that uses acid-gas-injection technology, and the Province is participating in studies regarding the sequestration of acid gas in coal seams.

First Nations

First Nations issues constitute a major public policy concern facing government and the natural gas industry today. The Province consults with First Nations on proposed government decisions where treaty or aboriginal rights are asserted. Where aboriginal or treaty rights are proven to exist, such as in Treaty 8, the Province consults as a means to avoid unjustifiable infringement of those rights. Memorandums of Understanding were established in 1998 to facilitate effective consultation and have been administered by the BC Oil and Gas Commission. Revised agreements were signed in early 2002. The Province is committed to working collaboratively with First Nations to enhance First Nations' participation in the economy and to address other issues that the Treaty 8 First Nations have raised. Engaging First Nations on these issues increases certainty for all stakeholders.

Customer Choice

In British Columbia, all natural gas sales to residential and small commercial consumers are made by local distribution companies, such as BC Gas and Centra Gas BC. These local distribution companies have a franchise on the distribution and sale of natural gas within particular regions of the province. The BC Utilities Commission approves the rates and those rates remain in effect until changed by the Commission.

Unlike the mortgage market, for example, where consumers can choose an array of offerings from multiple providers, natural gas customers cannot choose seller, price or contract term. There is scope to improve customer choice through a combination of greater competition and regulatory action.

Regulation and Role of Government

Since its establishment in 1998, the BC Oil and Gas Commission has made considerable progress. Nonetheless, there is an immediate need to move to results-based regulation, and to ensure that the Commission has the authority to regulate all activities relevant to the exploration and development of the oil and gas industry. The BC Oil and Gas Commission will require an enhanced capacity to do so.

With respect to a Northern Gas Pipeline and ongoing natural gas activity in the province, it is incumbent upon regulatory authorities involved, including the National Energy Board, Canadian Environmental Assessment Agency, Department of Fisheries and Oceans, and a variety of provincial agencies, to harmonize standards and procedures. Such regulatory harmonization is critical to development of the resource.

The Ministry of Energy and Mines has the responsibility to provide good policy direction and information on resource development, supported by science and analysis. Capacity to do so should be enhanced, particularly when a number of market signals, such as future energy demand and supply, need to be based on sound and independent work. The Ministry, as the government agent in carrying out stewardship responsibilities, is the appropriate centre for that activity.

Given the value of the resource and the importance of energy to all British Columbians, there is an ongoing need for highly competent regulators with adequate resources at their disposal.

> "... B.C. will be continually challenged to ensure that government policies and the regulatory framework are timely, certain and consistent."
>
> *Westcoast Energy*

RECOMMENDATIONS

The Task Force recommends the Province or agency responsible take the action outlined below.

6.01 Support and encourage industry to establish one or more natural gas storage facilities in or near the Lower Mainland, possibly including Vancouver Island, to serve British Columbia markets. The storage facility must be accessible to all parties selling natural gas directly to consumers and should be regulated by the BC Utilities Commission.

6.02 Through clear, certain and proactive planning and regulation, support, encourage and facilitate timely pipeline expansion. To ensure British Columbia's natural gas transmission system has adequate capacity to meet demand, the Task Force also recommends the following:

- sound and independent supply/demand forecasts to assist regulators and the market;
- investment returns that are competitive in the North American market; and
- establish a clear process for the BC Utilities Commission to ensure that adequate gas supplies and transmission capacity are reserved for the domestic market to ensure these consumers have access to natural gas at reasonable, stable rates.

6.03 Promote road infrastructure, specifically for oil and gas. In setting road priorities, consideration should be given to the economic benefits of resource development. Tools to help develop the infrastructure include innovative public-private partnerships and fiscal measures.

6.04 Expedite the development of pre-tenure plans in special management areas so that resource development, as envisioned in the Land Use Planning Process, can occur in a timely manner. Land-use priorities and conditions of access should be defined whether in special management areas, which require pre-tenure plans, or elsewhere.

6.05 Investigate appropriate measures for petroleum and natural gas tenure that allow for large-scale regional exploration within Interior basins.

6.06 Undertake geoscience studies aimed at enhancing opportunities in underexplored petroleum regions, such as the Interior basins, and identify underexplored or new petroleum resources for development in established regions within Northeast British Columbia.

6.07 Develop royalty regimes for new resource opportunities such as tight gas and Interior basins.

6.08 Create a system of royalty credits to encourage investment in high-cost and high-risk new resources.

6.09 Insist that the federal government lives up to its commitment under the *Northern Pipeline Act* to consult with the province and that the two jurisdictions work to facilitate passage of the pipeline through British Columbia to maximize benefits for the people of the province.

6.10 Establish flaring standards for both test flaring and ongoing flaring for operational purposes.

6.11 Promote acid-gas re-injection as the preferred method for handling waste-gas production by developing appropriate regulatory and fiscal regimes to ensure this becomes the method of choice for the industry.

6.12 Evaluate the potential and technical feasibility for large-scale greenhouse-gas (carbon dioxide) sequestration or subsurface waste-gas disposal in regions likely to require these technologies.

6.13 Insist that the federal government engage in serious discussions on treaty-related issues.

6.14 Work with industry to find creative means to engage First Nations in the development of energy in the province.

6.15 Support and encourage increased customer choice of provider and offerings for all natural gas customers and, particularly, residential and small commercial customers.

6.16 Eliminate the requirement for Energy Removal Certificates in order to streamline the regulatory approval process and avoid duplication of National Energy Board functions.

CHAPTER • 7
COAL

INTRODUCTION

Coal has been mined in British Columbia since the 1800s and is one of the largest energy resources in the province (see total reserves in Chart 12). Once an important fuel for heating and industrial activity, coal's domestic use was virtually eliminated in British Columbia by the development of hydroelectric, oil and natural gas resources.

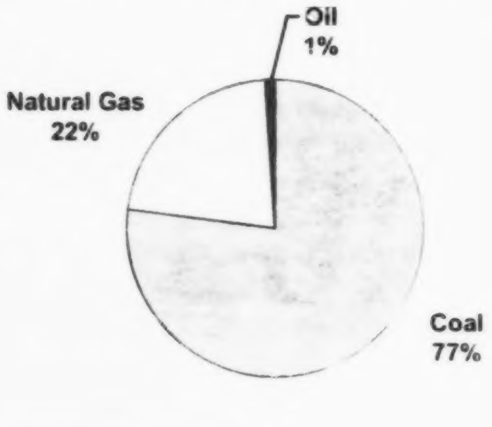
> "Conservation and alternative energy sources... will not be sufficient to meet the needs for the energy requirements of industrial growth and prosperity."
>
> *Mining Association of British Columbia*

Still, British Columbia's coal resources are estimated at more than 255 billion tonnes. Coalfields of varying quality, quantity and accessibility are located throughout the province. In 2000, approximately 26 million tonnes of coal, worth approximately $800 million, were mined in British Columbia, exported primarily for use in steel production.

In 2000/01, the province collected $17.9 million in direct resource revenues from the coal industry. The industry contributes to provincial corporate income taxes, and sales fuel and property taxes and is responsible for approximately 6,000 direct and indirect jobs.

In the United States, coal is experiencing a revival. The US National Energy Policy Report, released in May 2001, recommends policies and initiatives to provide long-term stable and secure energy resources. Central to the US report is the conclusion that coal will continue to be an important fuel source

Chart 12: British Columbia Hydrocarbon Reserves*
Total Reserves – 105,000 Petajoules



*Conventional reserves only
Source: National Energy Board

for electricity generation. To ensure its coal energy sources are compatible with environmental objectives, the US government plans to support $2 billion in research on clean-coal initiatives. In addition, private industry and the US government are working together to develop pilot projects to test clean-coal technologies.

As a result of the low Canadian dollar, British Columbia's coal resources are particularly attractive to American energy producers. While rail transportation costs remain the largest barrier to export markets, the Canadian dollar greatly extends the transportation radius. There are several new coal-fired generating facilities under consideration in the Pacific Northwest, and project developers are actively examining the potential of using coal from British Columbia.

In many areas of Canada, coal provides affordable and reliable electricity generation. Further, the development of new technologies to reduce coal emissions suggests that this fuel will continue to be used as a source of energy. As coal is by far the most abundant of British Columbia's hydrocarbon reserves, it could play an important role in our energy future as well.

HAT CREEK COALFIELD

The Hat Creek coalfield, located in central British Columbia, is recognized as an excellent location for clean-coal electricity generation or coalbed methane development. Since 1982, BC Hydro has maintained 38 coal licenses comprising 8,313 hectares in anticipation of using the resource to meet future generating needs. While BC Hydro maintains these licenses, the resource cannot be developed by others.

COAL-FIRED ELECTRICITY

Coal is used throughout the world to produce affordable and reliable electricity. According to the International Energy Agency, coal-fired electricity represents approximately 38 per cent of global electricity generation.

Canada uses coal-fired generation for approximately 18 per cent of its electricity generation. Alberta, Saskatchewan and Nova Scotia rely heavily on coal-fired electricity. British Columbia, Manitoba and Quebec rely primarily on hydroelectricity due to their large, low-cost hydro generation resources.

Currently, coal is not used to produce electricity in British Columbia. The Ministry of Energy and Mines estimates that approximately 15 billion tonnes of British Columbia's coal resources could be used for thermal electricity production. Of that, approximately 3 billion tonnes could be mined economically with available technology. The energy contained within those 3 billion tonnes of coal could supply British Columbia's total domestic electricity consumption for more than 120 years using today's thermal electricity production technology.

Volatile natural gas prices in 2000 and 2001 made coal an economically attractive energy source. While natural gas prices have dropped since early 2001, another sharp price increase could result in pressure to use coal as a replacement fuel. The Province needs an efficient, accountable and well-defined process to deal with this possibility.

There is continued interest in this energy resource for the following reasons:

- coal-mining companies want to diversify their markets and produce value-added electricity;
- independent power producers can sell electricity in export markets;
- there are highly profitable spot-market prices for electricity in Western North American markets;
- new technologies have reduced stack emissions and improved combustion efficiency; and
- coal-fired electricity plays a prominent role in the United States.

As electricity trade increases throughout North America, it will be increasingly difficult to identify where and how the electricity consumed in British Columbia is produced. BC Hydro trades electricity with Alberta, the Northwest power pool and other markets to ensure adequate electricity supplies and to provide the lowest electricity costs for British Columbians. As most other jurisdictions use coal-fired generation, the province already consumes electricity produced from coal.

The need for new electricity supply has been discussed in Chapter 5. Coal needs to be considered as a possible supply source. At a minimum, it appears advisable to treat coal-fired electricity in the same manner as any potential generation source reviewed in a rational process with clearly defined objectives.

ENVIRONMENTAL CONCERNS

The costs of implementing the Kyoto Protocol are the subject of current public debate. Energy generation investments in coal, in particular, may face significant costs associated with implementing the Protocol.

Industry concerns about federal and provincial environmental assessment processes include guidelines, scope, timing and duplication. These concerns act as a barrier to new projects.

In addition, the lack of final emission guidelines contributes to a climate of uncertainty for the coal sector. Interim emission guidelines for coal-generation plants have been in place since 1995. However, there are concerns that the final guidelines may be changed to make them consistent with existing North American requirements, leaving discretion in the hands of officials.

At present, there are currently no boiler-emission standards or guidelines for industrial coal users. Industrial coal users must apply to the Ministry of Water, Land and Air Protection for a permit under *The Waste Management Act*. The Ministry assesses requests on a case-by-case basis to determine the impact on local air quality. All coal users located in the Greater Vancouver Regional District must apply to the District for a permit. Projects deemed liable to have unacceptable impacts may not receive a permit or may be required to reduce those impacts.

COAL EMISSION CONTROL TECHNOLOGY

Various technologies have been developed to increase efficiency and remove or prevent emissions when coal is burned to generate electricity. In the near term, several technologies are being developed to replace conventional coal-fired power generation. These developments are characterized by high-thermal efficiency, very low pollutant emissions, reduced carbon dioxide emissions, few solid-waste problems and enhanced economics.

In the longer term, Zero Emission Coal (ZEC) technology is currently being developed which converts coal and water into hydrogen and carbon dioxide. The hydrogen is converted to electricity via a fuel cell, and the carbon dioxide is combined with silicate mineral deposits, where it is then safely and permanently stored as a carbonate. The process emits no greenhouse gases. The ZEC process converts 75-80 per cent of coal's energy into electricity, and compares favourably to efficiencies currently achieved by either conventional coal-fired plants (roughly 34 per cent) or natural gas-fired power plants (around 50 per cent).

The Hat Creek area of South-Central BC is regarded as a prime site for a pilot plant due to its favourable supplies of both coal and serpentine (for carbon dioxide sequestration).

A ZEC demonstration plant is contemplated for North America within five years, with a view to commercialization in 15-20 years.

Current Technology	Near-Term Technology	Long-Term Technology
• Physical coal cleaning • Atmospheric fluidized bed combustion • Wet or dry flue gas desulphurization • Post-combustion nitrous oxide control technologies • Sorbent injection systems	• Pressurized fluidized bed combustion • Integrated gasification combined cycle • Advanced combustion/heat engines • Gas reburning	• Zero Emission Coal

RECOMMENDATIONS

The Task Force recommends the Province or agency responsible take the action outlined below.

7.01 Review best practices, including the application of new coal technology to meet environmental standards and encourage pilot projects by industry.

7.02 Finalize emission guidelines for coal generating plants with stakeholders as soon as possible. As any provincial guideline may be superseded by federal requirements, relevant inter-governmental discussions need to be undertaken.

7.03 Develop guidelines on boiler emission standards.

7.04 Ensure that applications for permits are dealt with in a timely manner and that review processes are transparent and efficient. Impose timelines for the permitting process and review public consultation and appeal provisions to ensure that the public interest is adequately protected.

7.05 Review current environmental assessment processes to ensure coal is treated consistently with other energy sources.

CHAPTER • 8

REGULATION

INTRODUCTION

Government regulation of the energy sector ensures British Columbians receive safe and reliable energy services, investors earn a reasonable return, and environmental impacts are appropriately mitigated. As such, regulation fulfills the following public policy objectives:

- manages resources effectively, recognizing that the Crown is often the owner of the resource;
- resolves problems of monopoly power and ensures fair rates to consumers;
- provides effective environmental stewardship;
- protects the health and safety of workers and the public; and
- allocates benefits and promotes economic prosperity.

This chapter focuses on the current regulatory regime for energy in British Columbia and provides specific recommendations for regulatory reform.

BC's Current Regulatory Regime

Generally, regulations address specific energy industry activities or potential environmental impacts of large energy projects. The current regulatory regime in British Columbia deals with both issues and involves federal as well as provincial organizations.

Canada has a complex regulatory regime for the energy sector that includes national, provincial and local levels of government.

At the federal level, the following three government bodies provide regulatory oversight:

- The National Energy Board regulates inter-provincial activity and energy exports from Canada. However, unlike its counterpart in the United States, the Federal Energy Regulatory Commission, the National Energy Board has limited involvement in the electricity sector.
- The Department of Fisheries and Oceans has jurisdiction over fish and fish habitat in Canada's oceans and some inland waters.
- The Canadian Environmental Assessment Agency identifies a lead agency, often the Department of Fisheries and Oceans, to work with its provincial counterparts to provide project assessment. Assessment is undertaken on those energy projects above pre-determined thresholds. Coordination and harmonization of federal and provincial activities are essential for regulatory success.

REGULATION

Most regulatory activity in British Columbia takes place at the provincial level. The following provincial agencies and ministries provide oversight:

- The Ministry of Energy and Mines has the overall responsibility for energy policy in the province, thereby acting on the Crown's behalf as the steward of provincial energy resources. In this capacity, the Ministry is the lead agency on energy matters and the coordination of energy activity. The Ministry also plays a role in government's direction to BC Hydro.
- The Ministry of Sustainable Resource Management has the lead role on land-use and water-use management and the critical pre-tenure planning function.
- The Ministry of Water, Land and Air Protection is the province's lead agency for environmental protection and sets policy for water quality, waste management and wildlife.
- The BC Utilities Commission regulates energy utilities, sets rates and approves permits for new facilities and extensions to existing ones. It adjudicates on specific energy project proposals on the basis of ratepayers' need. It is a quasi-judicial body with a legal requirement to ensure procedural fairness; however, the *Utilities Commission Act* limits its ability to consider social, environmental and land-use matters for pipelines, transmission lines and generation plants.
- The BC Oil and Gas Commission regulates all functional activities in oil and gas. This includes exploration and development, production, processing and storage as well as the granting of permits and authorizations under legislative authorities including those related to forestry, land and environmental requirements.
- The BC Environmental Assessment Office manages and coordinates the review of major development projects, many of which are energy or mining related, to ensure a single, integrated assessment process involving all levels of government.

In addition to the above, local governments regulate the use of private land and therefore the siting of energy facilities through official community plans and zoning bylaws. The Greater Vancouver Regional District also has delegated authority from the Province for permitting requirements for air emissions and other matters.

THE NEED FOR REFORM

Influenced by competitive market forces, North American energy markets are becoming increasingly continental in nature. As a result, the energy sector requires better coordination of regulatory regimes within Canada and between Canada and the United States. This is particularly the case in electricity where regional markets, crossing provincial and international boundaries, are emerging in North America.

> "In order to grow the energy sector, increase jobs and income in BC, regulatory reform is the simplest and most transparent and will provide the quickest opportunities for growth."
>
> *BP Canada Energy Company*

Moving to competitive markets will lead to a different type of regulation. It should be emphasized that increased competition does not necessarily lead to full deregulation. It does, however, require a different type of regulatory oversight using an array of risk management tools. In addition, greater regulatory use of results- and performance-based practices, with their focus on outcomes, should lessen the regulatory burden for investors while still protecting consumer interests.

With respect to natural monopolies that transmit energy, most jurisdictions are moving to more flexible results-based models, as opposed to prescribing activities and controlling inputs. Defining outcomes setting targets and ensuring the necessary enforcement are proving more effective and efficient in achieving regulatory goals.

Performance-based rate setting is now used to provide incentives to keep consumer rates low. At the same time, negotiation is proving more effective than regulatory confrontation in settling differences among market participants.

Greater reliance on competitive markets often involves a transition from an existing state to the new competitive model. During this transition, as reform elsewhere in electricity markets has demonstrated, regulators need to be mindful of the best means to protect the consumer.

British Columbia's new regulatory regime must be based on best practices here and elsewhere. Ensuring a world-class regulatory regime in energy will require a number of policy changes. In addition to greater reliance on results-based and performance-based approaches, the following are the five major areas where reform is essential:

- national, provincial and local regulatory agencies with jurisdiction in British Columbia must harmonize and coordinate activity and thereby eliminate duplication of effort and process – this will take tremendous effort and commitment on the part of both the federal and provincial Cabinets and officials.

- regulatory objectives and rules, where necessary, must be transparent, clearly stated in writing and predictable;
- the regulatory process must be accountable, with outcomes prescribed, performance measured and, when necessary, swift corrective action taken;
- regulatory bodies must have the expertise and the financial and information resources to do the job. This will require flexible labour and job classification rules and the ability of regulators to charge for services rendered; and
- regulatory priorities and processes must be reviewed and updated periodically in response to evolving markets.

If acted upon using best practices as a guide, the changes outlined above will put British Columbia's regulatory regime on a world-class footing. This is critical if British Columbia is to attract private capital and develop the energy industry in this province as this Report envisions.

THE POLICY RESPONSE

The following proposed changes pertain to the six provincial ministries and agencies outlined earlier in this chapter and to specific processes for which these organizations are responsible. These proposed changes were informed by a number of submissions and presentations to the Task Force, including those made by regulators inside and outside the province.

These changes will have particular implications for the BC Utilities Commission, the BC Oil and Gas Commission and the BC Environmental Assessment Office. Even now, the BC Utilities Commission has already begun implementing results-based practice and performance-based rate setting. It is also making many of the changes being implemented by the US Federal Energy Regulatory Commission. In addition, the BC Environmental Assessment Office is undertaking a major reform of the current environmental assessment process to make it more streamlined, flexible and efficient.

> "...regulation should be results-based...."
>
> *Alcan Primary Metal Group*

Ministry of Energy and Mines

The key policy role of the Ministry of Energy and Mines needs to be enhanced if a new energy policy is to be adopted and implemented successfully. This is particularly important given the new structure proposed for Crown Corporations involved in energy and the required reform of the electricity market. To ensure that recommendations in this Report are implemented, the Ministry must:

- have energy policy expertise on a wide range of issues in order to guide energy policy implementation and monitor energy policy success;
- be given a clear mandate to negotiate and oversee the contract for endowment assets between the government and the new Crown Corporation responsible for electricity generation;
- ensure that markets are well informed by independent third-party analysis and forecasts; and
- eliminate Energy Removal Certificates immediately.

> "...the outdated Utilities Commission Act should be rewritten."
>
> *Alcan Primary Metal Group*

Ministry of Sustainable Resource Management

The Ministry of Sustainable Resource Management should focus on the following:

- timely pre-tenure planning, recognizing the energy priority areas of the province and the competition across jurisdictions for private investment.

Ministry of Water, Land and Air Protection

The Ministry of Water, Land and Air Protection is moving to performance-based regulation. It must also undertake the following:

- for energy emissions of various types, provide, as soon as possible, clear standards that are in writing, predictable and competitive with leading jurisdictions.

British Columbia Utilities Commission

The British Columbia Utilities Commission is a key regulatory body in the province's energy sector. It will play a leading role in energy policy implementation, if the policy recommendations in this Report are accepted. In carrying out this role, it must be proactive in providing good regulatory oversight, primarily to protect consumers, while increasing efficiency and reducing the regulatory burden on investors.

To meet these objectives, the following changes to the current regulatory framework are required:

- the *Utilities Commission Act* needs to be completely rewritten to reflect an ongoing results and performance-based approach.
- the independence of the Commission needs to be strengthened, starting with fixed-term appointments for commissioners.

- increased emphasis needs to be placed on the role of the regulator in undertaking risk management, given:
  - the development of regional markets in electricity and the transition required to get there (refer to the BC Utilities Commission oversight responsibilities outlined in Chapter 5).
  - the fact that our energy infrastructure is aging and at the same time infrastructure expansion is required.
  - the need to reform our electricity sector and in the process protect consumer interests, and
  - the potential for market failure, such as was the case with the Sumas natural gas trading hub in late 2000;
- the need for greater customer choice for energy and energy products;
- the need for better rate design to facilitate energy conservation and efficiency;
- the importance of regulatory certainty which is best provided through transparent and written guidelines;
- the need for ongoing dialogue on matters of mutual interest with our regulatory counterparts in Alberta, the National Energy Board and the US Federal Energy Regulatory Commission;
- the capacity to use energy rights-of-way more efficiently, and
- the importance of having the right expertise and the need for labour agreement and job classification flexibility to attract and retain it.

BC Oil and Gas Commission

The BC Oil and Gas Commission is serving as the prototype for single-window-permitting agencies for energy in British Columbia.

In so doing, it must evolve as an organization and undertake the following:

- move to a results-based model;
- attract and retain the necessary expertise. This will require flexible labour agreement and job classification rules; and
- enhance its permitting efficiency.

BC Environmental Assessment Office and Process

The BC Environmental Assessment Office and its mandate are critical to British Columbia's energy success. A number of changes are warranted. One set of changes pertains to issues that can be addressed by the provincial government. The other set of changes pertains to the federal/provincial relationship on environmental assessment and the fact that the current federal/provincial harmonization agreement on environmental review is up for renewal on April 16, 2002.

> "Build on the existing BCUC strengths for cost effective regulation of energy utilities."
>
> *Alcan Primary Metal Group*

Proposed changes to the process are outlined below:

Internal to British Columbia:

- streamline the assessment process for environmental impacts of large energy projects through the following:
    - use results-based practice, recognizing the role participating line ministries play in this regard,
    - clarify and provide certainty for the conditions proponents must meet, and
    - reduce time to final adjudication;
- improve flexibility for projects when the environmental impact is relatively low, using mechanisms other than full review where appropriate;
- better align power generation review thresholds with those applied federally and in Washington State; and
- strengthen the independence of the review process.

Federal/Provincial:

- renew and enhance the federal/provincial harmonization agreement recognizing the following:
    - the need to make this a federal/provincial priority for British Columbia and therefore the need for Cabinet involvement to ensure federal involvement at the highest level;
    - the need for all energy projects in the province to be subject to one process and only one, with the process improved and embedded in the agreement; and
    - the need for federal involvement to be streamlined and results-based;
- in order to achieve provincial energy goals resolve the serious difficulties created for project proponents by the Department of Fisheries and Oceans; and
- strengthen independence and governance of the entire review process, involving provision for an effective dispute-resolution process while ensuring full accountability.

In addition to the changes outlined above, there must be extensive regulatory policy coordination between provincial and local governments. As indicated to the Task Force by a number of presenters, this is not always the case when it comes to emission standards and other regulatory requirements of local governments in the Greater Vancouver Regional District. In most instances, province-wide standards are both feasible and desirable.

As a general rule, regulators need to communicate better and more frequently with the general public. Energy policy can be a complicated business. Informed consumers make more rational energy conservation and consumption decisions and this is in everyone's interest. Regulators must play a larger informational role in this regard

RECOMMENDATIONS

The Task Force recommends the Province or agency responsible take the action outlined below.

8.01 Strengthen the capacity of the Ministry of Energy and Mines to play the lead role in energy policy formulation and implementation in the province.

8.02 Ensure the Ministry of Sustainable Resource Management makes energy a priority in its pre-tenure planning activity.

8.03 Ensure the Ministry of Water, Land and Air Protection provides clear standards on energy emissions from all sources.

8.04 Strengthen the BC Utilities Commission, a key regulatory agency for energy in the province. This requires significant changes to regulatory practice, with a much greater reliance on a results-based and performance-based regulatory framework. A complete rewrite of the *Utilities Commission Act* is required.

8.05 Strengthen the BC Oil and Gas Commission and use it as a model for developing a single-window-permitting agency for energy.

8.06 Strengthen the BC Environmental Assessment Office and review process. This requires greater results-based practice. It also requires greater harmonization of process with the federal government and this should be accomplished by improving the Canada-British Columbia Agreement for Environment Assessment Cooperation that is currently under negotiation.

8.07 Resolve the difficulties investors are having with the Department of Fisheries and Oceans. This will require joint federal/provincial action at the highest levels.

8.08 Provide provincial standards for air emissions and thereby avoid duplication and confusion at the local level.

8.09 Encourage regulators to undertake greater public dialogue and debate with stakeholders and consumers, recognizing that education is the best means to facilitate energy conservation and consumer choice.

CHAPTER • 9
CONCLUSION

It has been more than a decade since British Columbia last considered an energy policy. Much has changed since then and much more needs to be done to position British Columbia's energy sector for the future.

Today's energy policy must consider the international scope of the sector and its associated market pressures. The influence of the 1970s oil embargo on oil prices provides an excellent example of how international events can alter energy policy in British Columbia and around the world. More currently, Canada's free-trade agreements with the United States and Mexico must be considered, as well as recent international initiatives, such as the Kyoto Protocol. Each of these has far-reaching implications for future energy development.

British Columbia must recognize that its new energy policy and markets will be influenced by geographical linkages, through its pipelines and transmission system, with the US Pacific Northwest and other Western States. The Province must also consider the potential effect of an Alaska gas pipeline. The Columbia River Treaty serves as a constant reminder of the connections between provincial and US energy policies. These continental linkages are key to determining the future direction of energy policy in British Columbia.

> "If the status quo remains, there will not be a reason or incentive for private investors to initiate meaningful projects in British Columbia."
>
> *Atco Power*

In addition to continental influences, today's energy sector faces pressures for better air quality and the need for environmental assessment prior to development.

The recommendations in this Final Report are consistent with the Terms of Reference provided to the Task Force. As with the Interim Report, some recommendations and policy options will lead to vigorous public debate. This is as it should be. However, the recommendations need to be examined as components of a whole – a comprehensive policy that will enable British Columbians to enjoy a safe, reliable, secure and environmentally sound supply of energy.

How does the province achieve the objective of a safe, reliable, secure and environmentally sound supply of energy? In the years since the original policies were put in place, both British Columbia and the energy world have changed dramatically. A new set of considerations now confronts the future of energy policy. As a result, British Columbia's new energy policy must meet the challenges of the twenty-first century. The following are the most critical areas for change:

1. Conservation, efficiency and the development of alternative energy sources: Conservation and efficiency are top priorities. In addition, the environmental, social and economic advantages of developing alternative energy sources are enormous. British Columbia needs to build on its reputation as a leader in the development of new technologies such as the fuel cell and diversify the range of energy options available to consumers. The proposed new foundation will facilitate this development.

2. Generating new supply through fully competitive markets in electricity: New electricity supply is needed to meet British Columbia's consumer requirements, enhance security and reliability and expand economic growth in the province.

To acquire new supply, we must have markets and pricing that attract investment. In the opinion of the Task Force, this requires the restructuring of BC Hydro into three separate and independent operating entities: generation, transmission and distribution. In particular, the electricity transmission system must be able to accommodate new energy producers and enable them to deliver their product to market on an equitable basis.

Electricity pricing needs to move to market levels and thereby provide good market signals. This process must occur within a time frame that balances the needs of industry and consumers to adjust with the need to attract investment and ensure new sources of supply to meet future demand.

3. The endowment and market prices: The endowment assets on the Peace and Columbia Rivers will continue to provide benefits to British Columbians. With rebates, the effective price of electricity will remain below market prices during the 10-year transition period. As a result, British Columbians will see a blended price of electricity.

The Task Force recommendations call for blended electricity prices for 10 years in order to allow industry and other consumers to adjust to full market prices while at the same time encouraging private investment in new sources of electricity supply. Full market prices do not need to be reached immediately but will be required eventually if both consumers and investors are to get the right price signals. Doing so over 10 years is both prudent and realistic.

During the 10-year transition to full market prices and for that matter, beyond, distribution companies, with BC Utilities Commission oversight, will be managing exposure to daily prices to ensure BC consumers are protected from market uncertainties and undue risk.

4. Development of natural gas storage capacity in the Lower Mainland: The Lower Mainland is one of the only major markets in North America without sufficient storage capacity, which exposes natural gas customers to the risk of price volatility when demand is particularly strong. A mechanism must be available to protect consumers from excessive price fluctuations.

5. Additional considerations for coal: Given the ongoing improvements in emission-control technology and abundant resources, coal could become a significant component of British Columbia's energy supply. Final guidelines and standards for emissions from coal-fired generation should be developed as soon as possible.

6. A new regulatory regime: Regulation of British Columbia's energy industry must be undertaken within a results- and performance-based framework. In addition, coordination and harmonization of the various regulatory processes must be achieved. In this latter context, the federal/provincial environmental assessment review process agreement should be strengthened and then renewed.

THE END RESULT

A competitive energy market will attract private capital and bring more energy supply, thereby increasing our energy security and reliability. Developing the energy sector will increase jobs and income for British Columbians, including income that supports government services. Developing a diversified mix of energy sources – electricity, natural gas, coal and alternative energy makes good economic, social and environmental sense.

There is a window of opportunity for the province to make the necessary policy changes. The result will be reliable, secure and environmentally sound supplies of energy. The original energy policy was a result of visionary and bold action on the part of the Province. A similar initiative is necessary today if British Columbia is to avoid future supply shortages.

British Columbia's energy sector can play a leading role in the expanding North American energy market. The province has the resources and the skills to make it happen. The energy sector can flourish and contribute to the social and economic development of the province for generations to come. If the past can serve as a guide, a comprehensive energy policy could become the equivalent of the two-river policy of the late twentieth century.

CHAPTER • 10

LIST OF RECOMMENDATIONS

The Task Force recommends the Province or agency responsible take the action outlined below.

CONSERVATION, EFFICIENCY AND ALTERNATIVE ENERGY

4.01 Use a portion of the endowment dividend to establish a foundation that supports comprehensive research and development in conservation, efficiency and alternative energy.

4.02 Set portfolio standards for renewable energy; these standards would apply to electricity distribution companies.

4.03 Adopt time-of-use pricing and net metering.

4.04 Rewrite the *Energy Efficiency Act* and Regulations.

4.05 Develop a wind project with private-sector expertise using federal funding as announced in the federal budget of December 2001.

ELECTRICITY

5.01 Develop a wholesale electricity market based on open access to the electricity transmission system. The development of this market must be consistent with market developments in Alberta and the US Pacific Northwest.

5.02 Establish an independent transmission entity as a Crown Corporation clearly separate from all generators, distribution utilities and retailers. All transmission in the province needs to be coordinated by that entity. The entity would be regulated and would:

- manage transmission assets;
- ensure reliability and security of the system;
- administer a wholesale market; and
- schedule and balance the transmission system.

The establishment of an independent transmission entity will necessitate the restructuring of BC Hydro.

5.03 Restructure BC Hydro. A new Crown Corporation responsible solely for generation from the endowment assets and Burrard Thermal needs to be established. In addition, four separate regional distribution utilities need to be established. Non-core assets need to be handled in a separate entity.

5.04 Establish Crown-owned entities on a commercial basis to resemble comparable, non-government-owned commercial enterprises.

5.05 Encourage private-sector investment in additional electricity generation in the province. This generation needs to be for both domestic and export markets.

5.06 Recognize Burrard Thermal as integral to British Columbia's electrical system. Burrard Thermal can be upgraded or replaced, the latter requiring lead time and significant financial resources.

5.07 Recognize Williston Reservoir's direct and valuable role in supporting electricity generation on the Peace River. The current water license for the Williston Reservoir should be respected.

5.08 Establish 10-year transitional arrangements for the market pricing of generation from the Columbia and Peace River dams, referred to as the endowment, and ensure all customers receive a fair share of the endowment through a rebate. The remaining rebate is to be government revenue with a portion directed to the Foundation on Conservation, Efficiency and Alternative Energy.

The Province also needs to take the following complementary policy action:

- remove the Provincial Sales Tax on energy inputs for industry, a tax policy unique to British Columbia;
- provide accelerated write-offs for investment in energy-saving technology; and
- provide rate design incentives to promote energy efficiency by all consumers.

5.09 Eliminate the electricity rate freeze on January 1, 2003, or sooner, and institute at least a three per cent per annum rate increase for three years to provide funding for electricity infrastructure upgrades and expansion, cost of service and the foundation.

5.10 Ensure the move to market pricing is fully coordinated with other major policy changes underway. This is particularly important in the forest sector.

5.11 Ensure distribution companies send strong price signals to consumers by reflecting full market prices in electricity bills.

OIL AND NATURAL GAS

6.01 Support and encourage industry to establish one or more natural gas storage facilities in or near the Lower Mainland, possibly including Vancouver Island, to serve British Columbia markets. The storage facility must be accessible to all parties selling natural gas directly to consumers and should be regulated by the BC Utilities Commission.

6.02 Through clear, certain and proactive planning and regulation, support, encourage and facilitate timely pipeline expansion. To ensure British Columbia's natural gas transmission system has adequate capacity to meet demand, the Task Force also recommends the following:

- sound and independent supply/demand forecasts to assist regulators and the market;
- investment returns that are competitive in the North American market; and
- establish a clear process for the BC Utilities Commission to ensure that adequate gas supplies and transmission capacity are reserved for the domestic market to ensure these consumers have access to natural gas at reasonable, stable rates.

6.03 Promote road infrastructure, specifically for oil and gas. In setting road priorities, consideration should be given to the economic benefits of resource development. Tools to help develop the infrastructure include innovative public-private partnerships and fiscal measures.

6.04 Expedite the development of pre-tenure plans in special management areas so that resource development, as envisioned in the Land Use Planning Process, can occur in a timely manner. Land-use priorities and conditions of access should be defined whether in special management areas, which require pre-tenure plans, or elsewhere.

6.05 Investigate appropriate measures for petroleum and natural gas tenure that allow for large-scale regional exploration within Interior basins.

6.06 Undertake geoscience studies aimed at enhancing opportunities in underexplored petroleum regions, such as the Interior basins, and identify underexplored or new petroleum resources for development in established regions within Northeast British Columbia.

6.07 Develop royalty regimes for new resource opportunities such as tight gas and Interior basins.

6.08 Create a system of royalty credits to encourage investment in high-cost and high-risk new resources.

6.09 Insist that the federal government lives up to its commitment under the *Northern Pipeline Act* to consult with the province and that the two jurisdictions work to facilitate passage of the pipeline through British Columbia to maximize benefits for the people of the province.

6.10 Establish flaring standards for both test flaring and ongoing flaring for operational purposes.

6.11 Promote acid-gas re-injection as the preferred method for handling waste-gas production by developing appropriate regulatory and fiscal regimes to ensure this becomes the method of choice for the industry.

6.12 Evaluate the potential and technical feasibility for large-scale greenhouse-gas (carbon dioxide) sequestration or subsurface waste-gas disposal in regions likely to require these technologies.

6.13 Insist that the federal government engage in serious discussions on treaty-related issues.

6.14 Work with industry to find creative means to engage First Nations in the development of energy in the province.

6.15 Support and encourage increased customer choice of provider and offerings for all natural gas customers and, particularly, residential and small commercial customers.

6.16 Eliminate the requirement for Energy Removal Certificates in order to streamline the regulatory approval process and avoid duplication of National Energy Board functions.

COAL

7.01 Review best practices, including the application of new coal technology to meet environmental standards and encourage pilot projects by industry.

7.02 Finalize emission guidelines for coal generating plants with stakeholders as soon as possible. As any provincial guideline may be superseded by federal requirements, relevant inter-governmental discussions need to be undertaken.

7.03 Develop guidelines on boiler emission standards.

7.04 Ensure that applications for permits are dealt with in a timely manner and that review processes are transparent and efficient. Impose timelines for the permitting process and review public consultation and appeal provisions to ensure that the public interest is adequately protected.

7.05 Review current environmental assessment processes to ensure coal is treated consistently with other energy sources.

REGULATION

8.01 Strengthen the capacity of the Ministry of Energy and Mines to play the lead role in energy policy formulation and implementation in the province.

8.02 Ensure the Ministry of Sustainable Resource Management makes energy a priority in its pre-tenure planning activity.

8.03 Ensure the Ministry of Water, Land and Air Protection provides clear standards on energy emissions from all sources.

8.04 Strengthen the BC Utilities Commission, a key regulatory agency for energy in the province. This requires significant changes to regulatory practice, with a much greater reliance on a results-based and performance-based regulatory framework. A complete rewrite of the *Utilities Commission Act* is required.

8.05 Strengthen the BC Oil and Gas Commission and use it as a model for developing a single-window-permitting agency for energy.

8.06 Strengthen the BC Environmental Assessment Office and review process. This requires greater results-based practice. It also requires greater harmonization of process with the federal government and this should be accomplished by improving the Canada-British Columbia Agreement for Environment Assessment Cooperation that is currently under negotiation.

8.07 Resolve the difficulties investors are having with the Department of Fisheries and Oceans. This will require joint federal/provincial action at the highest levels.

8.08 Provide provincial standards for air emissions and thereby avoid duplication and confusion at the local level.

8.09 Encourage regulators to undertake greater public dialogue and debate with stakeholders and consumers, recognizing that education is the best means to facilitate energy conservation and consumer choice.

APPENDIX • 1
TERMS OF REFERENCE

ENERGY POLICY DEVELOPMENT TASK FORCE

Introduction

British Columbia does not have an explicit energy policy. In recent years, energy policy has been implicit through decisions made or workshops sponsored by the BC Utilities Commission, by occasional government directives to the BCUC, through government direction to BC Hydro, through Requests For Proposals issued by government or BC Hydro, through activities of the Ministry of Energy and Mines or the Oil and Gas Commission. It has also been implicit in decisions and actions of the former Ministry of Environment (especially as it pertains to conservation and/or pollution abatement) and a number of related activities, regulations, direction or policy-implicit decisions).

Major issues face the energy sector in British Columbia. These issues relate to both structure and competitiveness. They also pertain to export policy, environmental protection and energy-sector development.

British Columbia must develop a comprehensive new energy policy, designed specifically to guide all participants in the energy sector as to where we are going and how best to get there.

In a broader context, recent continental energy price changes suggest that the demand for energy (electricity, natural gas, petroleum and coal) is strong. Such price movements have already triggered a supply response and British Columbia has the potential to take advantage of this increased demand, but only if we are structurally and competitively sound in a North American energy market that is increasingly interconnected.

Within British Columbia, today's energy market is characterized by the following factors:

- end-use demand for energy is growing;
- in the near-term, most new energy supply will be natural gas, power plants that are natural-gas fueled or expansions of existing hydroelectric developments;
- the growth of independent power has been limited;
- coal or coalbed methane sources of energy supply have yet to be developed;
- renewables or alternative energy show promise but to date have not been price competitive; and
- the infrastructure required to move British Columbia energy from source to market will require ongoing expansions – this expansion will need to be planned and market driven, recognizing the role of the private sector in infrastructure investment and the taking of risk.

Specific Objectives of Energy Policy

The objective is to develop an energy policy framework for British Columbia. As a framework, it will be developed at the macro level. This framework will be based on best practices worldwide, designed specifically to meet the energy needs of British Columbians and to foster energy development in the province consistent with exemplary environmental practices.

In addition to the principles outlined earlier, the work of the Task Force will be guided by a number of considerations and requirements as follows:

- there is a need to understand the demand/supply balance for energy in the province, recognizing international and continental factors including the fact that the province exports large quantities of energy and these exports generate considerable economic benefits for the province;
- there is a need to understand the likely demand for additional energy infrastructure in the next decade – this infrastructure being both inside and outside British Columbia since British Columbia imports and exports various sources of energy;
- energy policy will be informed by the key structural, competitiveness and environmental issues pertaining to each energy source;
- structural issues pertaining to generation, transmission and distribution of each energy source;
- competitiveness relating to the full array of input costs for each energy source;
- environmental issues pertaining to key environmental considerations relevant to each energy source;
- with respect to energy development, British Columbia is in direct competition with other jurisdictions;
- the importance of energy conservation and demand-side management in ensuring an appropriate demand/supply balance in energy;
- the future role for renewables; and
- the importance of transparency in energy pricing and transactions.

It should be noted that the Task Force will not be addressing offshore oil and gas. That issue is being handled in another forum.

Guiding Principles in the Formulation of Energy Policy

The Task Force is asked to build an energy policy framework with specific reference to the five principles outlined below:

Secure, reliable and environmentally sound supply

British Columbians require secure and reliable sources of energy, critical to the development of a modern economy. These must be developed and delivered in ways consistent with proper environmental stewardship.

Application of market forces

Energy policy is to be guided by the consistent application of market forces across all sources of energy, i.e. electricity, natural gas, oil, coal and renewables. Application of this principle should result in all sources of energy being subject to similar rigours of the market, focused as much as possible on competition and choice.

Regulation

Regulation should emulate market principles as much as reasonably possible, focussing on outcome-based principles and consumer protection.

Entitlement for British Columbians

British Columbians enjoy relatively low-cost electricity. This is a reflection of the province's competitive advantage in electricity and wise past investments. With North America increasingly becoming one energy market subject to competition, new sources of energy will come onstream at market prices. Current benefits should be treated as a British Columbia entitlement. It is the Task Force's job to determine appropriate means of regulating, using and distributing it.

Efficiency and accountability

Government agencies involved in the regulation and development of energy must be efficient and accountable.

Energy policy must be fully consistent with the government's overall policy thrust and the principles that underpin all government programs. In this regard, the Task Force is to be particularly mindful of the need to foster competition and choice and the importance of accountability in all activities undertaken or directed by government.

Organization and Accountability

The organizational structure for the Energy Policy Development Task Force includes the following features:

- overall responsibility for the development of energy policy rests with the Minister of Energy and Mines and the government
- the Energy Policy Development Task Force will provide a Final Report to the Minister according to the Terms of Reference in this document.

Details of the composition of the Task Force can be found in Attachment 1.

Time Frames and Reporting

The development of a provincial energy policy will occur in three phases leading ultimately to the announcement and implementation of core recommendations by legislation, regulation or administrative policies and procedures. The Task Force anticipates that the policy development process, including implementation, will be completed within 12 months.

BUILDING AN ENERGY POLICY

Phase 1: Preparation of Background Paper and Draft Energy Policy Report

By September 30, 2001
Background reports on trends in energy demand and supply; the status of the British Columbia energy sector; a review of energy policy development in British Columbia; and a summary of energy policies in other jurisdictions.

By November 30, 2001
Draft Energy Policy Report providing recommendations to the Minister of Energy and Mines on an energy policy for British Columbia.

Phase 2: Preparation of Final Report

By January 15, 2002
Consultation with selected parties - January 15, 2002.

Phase 3: Submission of Energy Policy Report

By February 15, 2002
Energy Policy Report submitted to the Minister of Energy and Mines.

Phase 4: Establishment of British Columbia's Energy Policy

By February 28, 2002
Announcement by government of an energy policy for British Columbia.

COMPOSITION OF THE TASK FORCE

The Energy Policy Development Task Force will be chaired by **Jack Ebbels**, Deputy Minister of Energy and Mines, and will include the following:

J. Peter Meekison, former Deputy Minister, Federal and Intergovernmental Affairs, Alberta;

John Bechtold, former senior executive with Petro Canada having extensive knowledge in natural gas;

Erik Westergaard, an expert on electricity issues with extensive experience in Australia and New Zealand and now a Vancouver-based management consultant on energy.

Brenda Eaton, Deputy Minister to the Premier and a former Deputy Minister of Energy and Mines.

The Secretary to the Task Force will be Ross Curtis, Assistant Deputy Minister of Energy and Mines.

The Task Force will be advised by a work program directed by Doug Allen, a former provincial Deputy Minister who has worked on energy issues for the last five years and who will be supported by a number of energy experts inside and outside government.

APPENDIX • 2

ENERGY POLICY TASK FORCE – WORKING GROUP MEMBERS

Working Group	Membership*
Conservation, Efficiency and Alternative Energy	Dan Green, Chair (MEM) David Molinski (MEM) Brenda Goehring (BC Hydro) Janice Larson (MEM) Sari Shilson (MEM) Denise Mullen-Dalmer (MEM) Stewart Wilson (MEM)
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Oil and Natural Gas	Steve Roberts, Chair (MEM) Stirling Bates (MEM)
Coal	Karen Koncohrada, Chair (MEM) David Molinski (MEM) Janice Larson (MEM) Roger McLaughlin (MEM)
Regulation	Patrick O'Rourke, Chair (MEM) Ann McLean (AG) Karen Koncohrada (MEM) Roger McLaughlin (MEM) Stirling Bates (MEM) Sandra Kilmartin (MEM) Ken Kadonaga (OGC)

* *Supported by a number of experts inside and outside government with particular assistance from officials at the Ministry of Water, Land and Air Protection*

MEM – Ministry of Energy and Mines

CAS – Crown Agencies Secretariat

AG – Attorney General

OGC – BC Oil and Gas Commission

APPENDIX • 3

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APPENDIX • 4

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APPENDIX • 5

MEETINGS HELD WITH STAKEHOLDERS AND THE ENERGY POLICY TASK FORCE AFTER THE RELEASE OF THE INTERIM REPORT

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Atco Power

BC Gas

BC Public Interest Advocacy Centre

BC Hot House Growers

BC Hydro and Power Authority

BP Canada Energy Company

BC Business Council

Calpine Canada Resources

Canadian Association of Petroleum Producers/Apache Canada

Canadian Electricity Association

Central Heat Distribution

Coal Association of Canada

Coral Energy

David Suzuki Foundation

Fording Coal

Highland Valley Copper

Hupacasath First Nation

Independent Power Association

Joint Industry Electricity Steering Committee

Klohn Crippen

Mining Association of British Columbia

Minister of Water, Land and Air Protection

Mirant Canada Energy Marketing

Nexen Chemicals

Norske Canada

Pembina Institute

Pacific Northwest Gas Power

Reach for the Unbleached

Sierra Club of BC

Taylor Management

UtiliCorp Networks Canada

Westcoast Energy

West Coast Environmental Law Association

Westcoast Power

Williams Pipelines

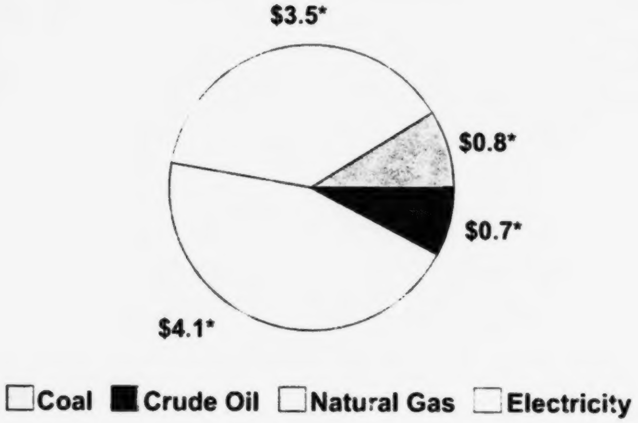
APPENDIX • 6
OVERVIEW OF ENERGY SECTOR

BRITISH COLUMBIA'S ENERGY SECTOR

British Columbia's energy sector is large and diverse. It encompasses hydroelectric power; oil, natural gas and coal resources; cutting-edge alternative technologies such as hydrogen fuel cells; innovative ventures in wind, wave and solar power; and highly developed transmission and distribution systems for delivering energy to industry and individual consumers.

In 2000, the total value of British Columbia's energy sector was estimated at $9.1 billion, as illustrated in the chart below. Direct revenues to government in 2000/01 were estimated at $3.4 billion. This includes royalties from oil and gas exploration, development and export trade activities, water rentals from electricity generation, dividend payments from BC Hydro as well as taxes on transportation fuels.

Chart 13: Value of BC Energy Production 2000 - $9.1 Billion



Note: Natural Gas Liquids are combined with natural gas.

**billion*

Source Ministry of Energy and Mines

Production

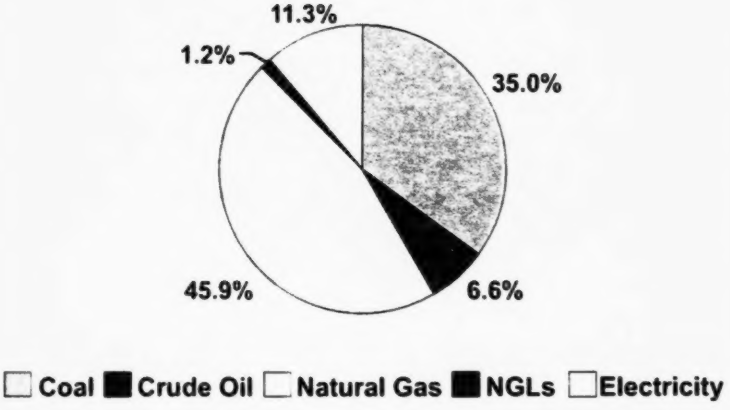
The reliable supply of competitively priced energy is fundamental to the international competitiveness of British Columbia industries. The energy sector contributes to the provincial economy as well as to the employment, wealth and quality of life of individual British Columbians. More than half the total value of British Columbia's energy sector is attributable to electricity; however, electricity represents only about 11 per cent of total energy produced in British Columbia. The balance of annual energy produced in British Columbia comes from fossil fuels, e.g. natural gas, crude oil and coal.

Imports

Although British Columbia is a net exporter of energy, the province also imports energy. As British Columbia has only two petroleum refining facilities (the Chevron refinery in Burnaby and the Husky refinery in Prince George), it must import most of its refined petroleum products, i.e. gasoline, diesel, fuel oil, and aviation fuels, primarily from Alberta. In 2000, this amounted to approximately 400,000 terajoules[1] of refined petroleum products.

British Columbia also imports electricity from Alberta and the United States during off-peak periods in order to conserve water and maximize generating capacity so that it can export excess electricity when market prices are higher.

Chart 14: BC Primary Energy Production - 2000
Total Production - 1,911,623 terajoules



(NGLs = natural gas liquids)

Source: Statistics Canada

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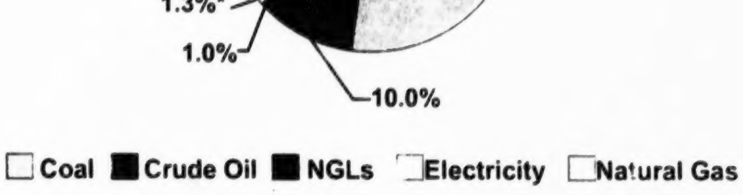
[1] *These different sources of energy have different energy potentials. In order to compare different energy sources, all energy values are converted into a common value, a joule. A joule is the metric measurement of work, equal to one kilogram accelerated at one meter per second. As an example, an average residential home in British Columbia annually consumes approximately 161 billion joules of energy for heating, lighting and appliances. As the consumption of joules is enormous, the standard reference is the terajoule (10 x 12 joules), e.g. the average residential home annually consumes 0.161 terajoules.*

Exports

British Columbia is a major exporter of energy to markets in Canada, the United States, Asia, Europe, Central and South America.

These exports are dependent on a means of transporting the resource. Natural gas, natural gas liquids, crude oil and refined petroleum products are exported through pipelines. Electricity is exported on high-voltage transmission lines. Coal is transported by rail and ships. Infrastructure, technology, and a specialized workforce are critical to creating value-added energy products for export.

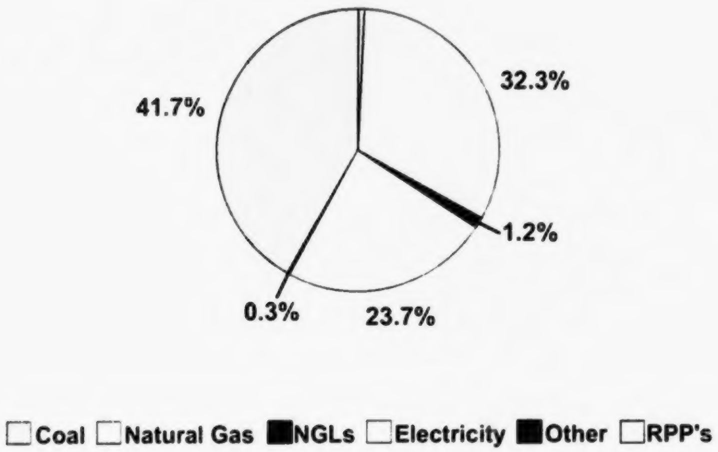
Chart 15: BC Net Energy Exports - 2000
Total Energy: 1,255,254 Terjoules



In fiscal year 2000/01 British Columbia was a net importer of electricity.

Source Statistics Canada

Chart 16: BC Energy Final Consumption by Fuel – 2000
Total Energy: 927,836 Terjoules



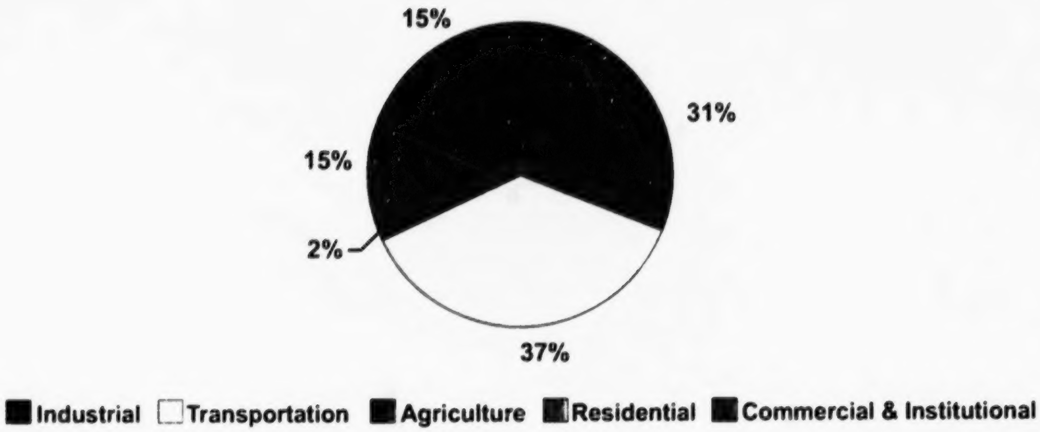
Source Statistics Canada

Consumption

Consumption of refined petroleum products such as gasoline, diesel fuel and light fuel oil represented roughly 42 per cent of all energy consumed in British Columbia in 2000.

When viewed by sector, the transportation sector represents a significant portion of energy consumption in British Columbia.

Chart 17: BC Energy Consumption by Sector - 2000
Total Energy: 931,110 Terjoules



Source Statistics Canada

Energy consumption changes over time in response to several factors, including the following:

- the rate of economic growth;
- population growth;
- prices of different energy sources;
- weather;
- changes in technology; and
- government policies.

One of the most important factors affecting future energy consumption in British Columbia is the rate of population growth. BC Stats anticipates that the population will continue to grow over the next two decades. In addition, the Ministry of Finance predicts continued economic expansion for British Columbia and Canada over the next several years. Even with the recent downturn in North American economies, indicators suggest that the demand for energy will increase over this period.

BC Hydro anticipates an annual rate of growth of 1.8 per cent per year in electricity consumption in British Columbia over the period to 2009/10 and forecasts a need for new major supplies in 2010 to serve domestic demand BC Gas estimates an increase in gas demand in the consumer and industrial sectors of approximately 1.5 per cent annually until 2009.

A number of external factors could affect current forecast estimates of supply and demand. These include climate-change policy, energy efficiency, variations in economic growth, change in population growth and new technology.

WORLD CONSUMPTION GROWTH

The following table highlights world energy demand growth over the period 1999-2020 World energy consumption is projected to rise by 59 per cent during the forecast period

The highest forecast growth in energy consumption, at about four per cent annually, is in the developing countries, particularly those of Asia, Central and South America. Much of this increase is attributed to expectations for strong economic growth which will raise living standards and create new demand for motor vehicles, home appliances, cooking, heating and cooling services.

Worldwide, a large portion of the growth in energy consumption will come from the use of fossil fuels, i.e. natural gas, oil and coal Should new initiatives such as the Kyoto Protocol be implemented, the outlook might change, with alternative energy satisfying a larger portion of energy consumption needs

Chart 18: World Energy Demand Growth – 1999 to 2020

		Energy Demand Projections (106 terajoules)				Average Annual Per cent Change
Region/Country	**1999**	**2005**	**2010**	**2015**	**2020**	
North America	122	136	146	155	164	1.4
United States	102	113	120	127	134	1.3
Canada	14	15	16	17	18	1.2
British Columbia	1.1	1.2	1.3	1.4	1.5	1.1
Total Industrialized	221	243	257	271	285	1.2
Total Eastern Europe/ Former Soviet Union	53	59	64	71	76	1.7
Total Developing	128	162	196	235	279	3.8
Total World	403	463	517	576	640	2.2

Source: Except for the British Columbia numbers (Canadian National Energy Board), information was taken from the International Energy Agency Report, International Energy Outlook 2001

Projections are that oil will remain the dominant energy fuel throughout the forecast period. In industrialized countries, increases can be attributed largely to the transportation sector, where there is limited competition from substitute fuels. In developing countries, oil consumption is expected to increase for all end uses.

Growth in natural gas is projected to be fastest among primary energy sources worldwide. It is expected to maintain a 3.2 per cent annual growth rate for the entire forecast period. Most of this expected growth is for electricity generation; however, in developing countries where natural gas infrastructure has not been widely promoted or established, the increase in gas use will be less.

Worldwide coal use will increase by an estimated 36 per cent. Use in developing countries will account for a large portion of this growth, with China and India accounting for 90 per cent of the total. On the other hand, there will be a substantial decline in countries where natural gas is a viable substitute.

Worldwide consumption of electricity generated from nuclear power is expected to increase by seven per cent, and from hydraulic and other renewable resources by approximately two per cent per year.

The supply of the various energy sources is driven by the cumulative demand in any given region, together with price which is driven generally by economic growth and the prices of competitive fuels. In general, the world has sufficient reserves of fossil fuels in particular coal, to meet increasing demand, as well as significant potential in renewable forms of energy. Price will determine supply.

CANADA'S ROLE

Canada is the fifth largest energy producer in the world. In 2000, approximately 35 per cent of Canada's energy production was exported. Of the energy produced, approximately two-thirds is from Alberta, with British Columbia now becoming a significant producer. Revenues from energy trade are significant, with the United States being the largest export consumer. In 2000, approximately 49 per cent of Canada's primary energy production was natural gas and liquids, followed by oil (32 per cent), electricity (10 per cent), and coal (10 per cent).

APPENDIX • 7

ENERGY CONSERVATION AND EFFICIENCY MEASURES

ADDITIONAL ENERGY EFFICIENCY MEASURES

The following measures are considerations for more energy-efficient building construction:

- mandatory R-2000 Building Code for new homes;
- adoption of the Model National Energy Code for Houses;
- mandatory EnerGuide for houses program;
- mandatory energy efficiency renovator training and certification;
- mandatory energy retrofits for commercial buildings;
- code requirement for heat pump combined systems where possible;
- continuation and expansion of the BC Buildings Corporation Green Buildings program to ensure all government facilities are energy efficient; and
- avoiding the use of electric space heating in new construction.

To encourage more efficient and less-polluting vehicles and transportation, the following measures are also used:

- mandatory fuel-economy standards for fleets;
- low- and zero-emission vehicles in the sales percentage;
- fuel-economy standards for all new vehicles;
- province-wide Aircare standards;
- mandatory inspection and maintenance programs for all vehicles;
- accelerated vehicle retirement;
- congestion road pricing;
- parking pricing;
- fuel quality requirements; and
- mandatory renewable energy content in gasoline.

For industrial consumers, the following changes are often advised:

- incentives for district energy;
- mandatory energy-efficiency and best-practices standards for all industries;
- mandatory power quality standards for all industries;
- mandatory installation of cogeneration systems in all appropriate circumstances;
- accelerated tax write-offs for renewable energy systems; and
- negotiated agreements with energy-intensive sectors to set energy-efficiency targets.

And for residential consumers, the following energy conservation and efficiency measures are often advocated:

- mandatory power conservation programs for all utilities;
- mandatory energy-efficiency standards for all appliances and equipment; and
- extension and expansion of energy labeling.

Source: British Columbia Ministry of Energy and Mines

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APPENDIX • 8

COMPARATIVE ELECTRICITY PRICES

COMPARISON OF MONTHLY BILLS – CANADA AND WESTERN U.S. ELECTRIC UTILITIES AS OF JANUARY 1/2002

PROVINCE AND CITY	DATE RATE EFFECTIVE	RESIDENTIAL USE			GENERAL USE				LARGE INDUSTRIAL 50,000 kVA 95% Power Factor	
		250 kW.h	1,000 kW.h	2,500 kW.h	30 kW 6,000 kW.h	300 kW 120,000 kW.h	1,000 kW 400,000 kW.h	4,000 kW 1,600,000 kW.h	65% LF per kW.h	85% LF per kW.h
WESTERN USA (See Note Below)										
Bellingham	**1 Jul 2001**	**$29.04**	**$89.55**	**$257.17**	**$642**	**$13,245**	**$36,040**	**$143,437**	**6.859¢**	**6.635¢**
Seattle	**1 Oct 2001**	**$21.95**	**$109.82**	**$317.42**	**$587**	**$11,822**	**$36,888**	**$148,014**	**8.806¢**	**8.797¢**
Los Angeles	**1 May 1998**	**$41.98**	**$166.48**	**$415.49**	**$1,323**	**$17,787**	**$55,808**	**$222,995**	**12.907¢**	**11.730¢**
BRITISH COLUMBIA										
Vancouver	1 Apr 1996	$17.88	$61.16	$147.71	$394	$5,584	$18,248	$73,199	3.577¢	3.347¢
Trail-Rossland	1 Jan 2002	$22.54	$63.86	$146.49	$393	$7,059	$18,567	$72,646	3.824¢	3.613¢
ALBERTA										
Calgary*	1 Jan 2002	$33.56	$90.32	$203.86	$560	N/A	N/A	N/A	N/A	N/A
SASKATCHEWAN										
Regina	1 Jan 2002	$33.04	$92.66	$211.91	$485	$8,475	$28,210	$78,531	4.473¢	4.323¢
MANITOBA										
Winnipeg	1 Apr 1997	$20.24	$58.94	$136.34	$360	$5,342	$15,916	$63,664	3.249¢	2.950¢
ONTARIO										
Toronto	1 Jun 2001	$31.34	$92.95	$216.18	$530	$9,944	$29,399	$115,684	7.333¢	6.698¢
QUEBEC										
Montreal	1 May 1998	$23.55	$60.33	$149.88	$456	$8,055	$23,747	$86,798	4.236¢	3.809¢
NEW BRUNSWICK										
Saint John	1 Oct 2001	$30.15	$80.77	$163.42	$591	$9,423	$25,690	$102,760	5.332¢	4.873¢
NOVA SCOTIA										
Halifax	1 Mar 1996	$31.38	$94.00	$219.25	$671	$7,696	$25,298	$99,857	5.855¢	5.496¢
NEWFOUNDLAND										
St. John's	1 Jan 2002	$32.01	$82.17	$181.47	$623	$8,025	$24,099	$92,758	5.378¢	5.091¢

Bills include all discounts and riders where identifiable, but do not include GST, Provincial, State or Franchise taxes

**Large industrial bills for Calgary not available due to deregulated, competitive pricing and confidential nature of individual contracts*

NOTE Western USA amounts are Canadian equivalents based on January 2002 payment rate of exchange 1.60

Source BC Hydro

COMPARATIVE ELECTRICITY PRICES

COMPARISON OF MONTHLY BILLS – CANADA AND WESTERN U.S. ELECTRIC UTILITIES AS OF JANUARY 1/2002

PROVINCE AND CITY	DATE RATE EFFECTIVE	RESIDENTIAL USE			GENERAL USE				LARGE INDUSTRIAL 50,000 kVA 95% Power Factor	
		250 kWh	1,000 kWh	2,500 kWh	30 kW 6,000 kWh	300 kW 120,000 kWh	1,000 kW 400,000 kWh	4,000 kW 1,600,000 kWh	65% LF per kWh	85% LF per kWh
WESTERN USA (See Note Below)										
Bellingham	**1 Jul 2001**	**$29.04**	**$99.55**	**$257.17**	**$642**	**$13,245**	**$36,040**	**$143,437**	**6.859¢**	**6.635¢**
Seattle	**1 Oct 2001**	**$21.95**	**$109.82**	**$317.42**	**$587**	**$11,822**	**$36,888**	**$148,014**	**8.806¢**	**8.797¢**
Los Angeles	**1 May 1998**	**$41.98**	**$166.48**	**$415.49**	**$1,323**	**$17,787**	**$55,808**	**$222,995**	**12.907¢**	**11.730¢**
BRITISH COLUMBIA										
Vancouver	1 Apr 1996	$17.88	$61.16	$147.71	$394	$5,584	$18,248	$73,199	3.577¢	3.347¢
Trail-Rossland	1 Jan 2002	$22.54	$63.86	$146.49	$393	$7,059	$18,567	$72,646	3.824¢	3.613¢
ALBERTA										
Calgary*	1 Jan 2002	$33.56	$90.32	$203.86	$560	N/A	N/A	N/A	N/A	N/A
SASKATCHEWAN										
Regina	1 Jan 2002	$33.04	$92.66	$211.91	$185	$8,475	$28,210	$78,531	4.473¢	4.323¢
MANITOBA										
Winnipeg	1 Apr 1997	$20.24	$58.94	$136.34	$360	$5,342	$15,916	$63,664	3.249¢	2.950¢
ONTARIO										
Toronto	1 Jun 2001	$31.34	$92.95	$216.18	$530	$9,944	$29,399	$115,684	7.333¢	6.698¢
QUEBEC										
Montreal	1 May 1998	$23.55	$60.33	$149.88	$456	$8,055	$23,747	$86,798	4.236¢	3.809¢
NEW BRUNSWICK										
Saint John	1 Oct 2001	$30.15	$80.77	$163.42	$591	$9,423	$25,690	$102,760	5.332¢	4.873¢
NOVA SCOTIA										
Halifax	1 Mar 1996	$31.38	$94.00	$219.25	$671	$7,696	$25,298	$99,857	5.855¢	5.496¢
NEWFOUNDLAND										
St. John's	1 Jan 2002	$32.01	$82.17	$181.47	$623	$8,025	$24,099	$92,758	5.378¢	5.091¢

Bills include all discounts and riders where identifiable, but do not include GST, Provincial, State or Franchise taxes.

**Large industrial bills for Calgary not available due to deregulated, competitive pricing and confidential nature of individual contracts.*

NOTE: Western USA amounts are Canadian equivalents based on January 2002 payment rate of exchange 1.60.

Source: BC Hydro

APPENDIX • 9

SCAN OF ALTERNATIVE ENERGY SECTOR IN BRITISH COLUMBIA

SECTOR	APPLICATIONS	BENEFITS	DEVELOPMENT POTENTIAL	AVAILABILITY	BARRIERS TO DEVELOPMENT
Small/Micro Hydro	Electricity, heating, emissions reduction	energy diversification – low post-startup fuel costs – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	Medium – High – abundant resources – mature technology – British Columbia expertise	Presently available	– market access – regulatory issues – land-use issues – uneven playing field – higher capital costs – subject to fluctuating water levels
Hydrogen/Fuel Cells	Electricity, heating, transportation, emissions reduction	energy diversification – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	High – abundant resources – British Columbia expertise	Mid-long term	– high capital costs – uneven playing field – market access – regulatory issues
Wind	Electricity, emissions reduction	– energy diversification – no post-startup fuel costs – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	Medium – abundant resources – terrain challenges – mature technology	Presently available	– market access – regulatory issues – land-use issues – uneven playing field – intermittent nature of supply – higher capital costs
Wave	Electricity, emissions reduction	– energy diversification – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	Medium – abundant resources – developing technology – highly site-dependent	Near-mid term	– higher capital costs – market access – uneven playing field – coastal/marine use issues – regulatory issues
Solar	Electricity, heating, emissions reduction	– energy diversification – no post-startup fuel costs – could produce hydrogen – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	Medium-low – some mature technology – limited British Columbia resources	Presently available	– higher capital costs – uneven playing field – intermittent nature of supply – low consumer awareness – market access – regulatory issues

SECTOR	APPLICATIONS	BENEFITS	DEVELOPMENT POTENTIAL	AVAILABILITY	BARRIERS TO DEVELOPMENT
Tidal	Electricity emissions reduction	– energy diversification – no post-startup fuel costs – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	Medium – abundant resources – developing technology – highly site-dependent	Mid-long term	– higher capital costs – coastal/marine use issues – uneven playing field – market access – regulatory issues
Biomass/ Biogas/ Biofuels	Electricity, heating transportation emissions reduction	– energy diversification – co-combustion possibilities – value-added use of wastes – commercial byproducts – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	High – abundant resources	Some presently available	– higher capital costs – market access – low consumer awareness – regulatory issues – uneven playing field
Geothermal	Electricity, heating, emissions reduction	– energy diversification – no post-startup fuel costs – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	Medium-High – abundant resources	Presently available	– higher capital costs – low consumer awareness – uneven playing field – regulatory issues – market access
Conventional Energy Innovations	Electricity, heating transportation, emissions reduction	– energy diversification – co-combustion potential – commercial byproducts – potential emission offsets – industry development – can supplement/replace conventional energy use – improved air/water quality	Medium-High – abundant resources – British Columbia expertise	Some presently available	– low consumer awareness – regulatory issues – higher capital costs

APPENDIX • 10

GLOSSARY OF TERMS

Adverse Water Conditions: Low streamflow or reduced head that restrict the production of hydroelectric power.

Appropriate Price Signals: Prices are a signaling and incentive system that provides feedback about the relative scarcity of resources. When prices are artificially controlled, consumers are unable to make purchasing decisions based on the true scarcity of resources and either too much or too little is consumed. Appropriate price signals give consumers the opportunity to make behavioral changes such as shifting energy demands to different times of day or purchasing energy efficient appliances and equipment to reduce energy consumption.

Base Load: The minimum continuous load over a given period of time.

Capability: The maximum load that a station or equipment is capable of carrying under specified conditions.

Capacity: The maximum power output or the load for which a generating unit, generating station, or other electrical apparatus is rated. Common units include kilovolt-ampere (kVA), kilowatt (kW) and megawatt (MW).

Cogeneration: The combined production of electricity and useful heat. Cogeneration is often employed at industrial plants where the heat produced can be utilized in the manufacturing processes and for general space heating. Cogeneration facilities use significantly less fuel to produce electricity and thermal energy than would be needed to produce them separately.

Current Average Price: The current pricing methodology is based on the average total system cost of providing a unit of electricity (per megawatt-hour for wholesale and per kilowatt-hour for retail) during a specific period. Cost of service (i.e., what the customer pays) is where the regulator approves rates at a level that will cover operating costs and provide an opportunity to obtain a reasonable rate of return on the invested property devoted to the business.

Dependable Capacity: The load-carrying ability of a station or system under adverse conditions, as for example, the capacity of a hydro station under defined low-flow conditions.

Diversity: The phenomenon of different loads reaching their peak levels at different times

Electricity: A manufactured form of energy, as opposed to naturally occurring energy resources such as coal, oil or natural gas. On a large scale, electricity is produced by rotating machines (generators) which operate on the principle that an electric current is generated whenever a conductor moves through a magnetic field.

Electricity Wholesale Market: Wholesale electricity markets are comprised of transactions between buyers and sellers of bulk power at high-voltage transmission. Except for those buyers who are considered transmission-level customers, players in the wholesale market do not sell electricity to end users such as residential or commercial customers.

Energy: Defined by physicists as the capacity for doing work. Although the international unit of energy is the joule, electric energy is measured commercially in kilowatt hours. Residential meters record a household's consumption of electric energy in kilowatt hours over a period of time.

Energy Market Convergence: The movement toward the union of energy commodity markets. Convergence of the market occurs when fuels become substitutable and where the actions in one market (such as electricity) affects what is done in another (such as natural gas).

Environmental Impact: Any human alteration to the environment affecting human, animal, fish, and/or plant life. Pollution results in an adverse environmental impact because it is detrimental to human, animal and plant life.

Gigawatt-hour (GWh): One million kilowatt hours (kWh).

Grid: A network of electric power lines and connections.

Installed Capacity: The total of the capacities shown on the name plates of the generating units in a power plant.

Kilowatt (kW): 1,000 watts (W) or 1.34 horsepower (hp).

Kilowatt-hour (kWh): 1,000 watt hours (Wh) – the amount of electrical energy produced or consumed by a one-kilowatt unit for one hour.

Line Loss: The energy or power lost in circuits or equipment, mainly in the form of heat, when current flows through circuits.

Load: The amount of electric power or energy consumed by a particular customer or group of customers.

Megawatt (MW): 1,000 kilowatts (kW) or one million watts (W).

Net Metering: A simplified method of metering the energy consumed and produced at a home or business that has its own renewable energy generator.

Nuclear Power: Power generated at a station where the steam to drive the turbines is produced by an atomic process, rather than by burning a combustible fuel such as coal, oil or gas.

Peak Demand: The maximum load consumed by a customer or a group of customers or a system in a stated period of time such as a month or a year.

Petajoule: Gigajoule 10 to the 9th (billion), terajoule 10 to the 12th (trillion), petajoule is 10 to the 15th (quadrillion).

Portfolio Standards: A portfolio standard is a regulatory approach that sets a minimum target for energy supply from specific fuels and/or technologies, similar to minimum standards established for building efficiency or fuel efficiency.

Power: The rate of doing work. In other words, it is the rate of delivery of energy. The international unit of power is the watt or the kilowatt (1000 watts).

Power Pool: A power pool is a grouping of two or more interconnected electric systems planned and operated to supply power in the most reliable and economical manner for their combined load requirements.

Power Systems: Virtually all the facilities used by an electrical utility to supply electricity to its customers are interconnected to form a "system." The system comprises generating stations, transformers, switching stations, transmission lines, substations, distribution lines, circuits to the customers' premises, and indeed all the different components required to provide electrical service to the consumer.

Primary Energy Source: The source of primary energy from which electricity is generated. For example, falling water, uranium (by nuclear fission), coal, oil, natural gas, wind, or tidal energy.

Public Utility: A person, or the person's lessee, trustee, receiver or liquidator, who owns or operates in British Columbia, equipment or facilities for:

- the production, generation, storage, transmission, sale, delivery or provision of electricity, natural gas, steam or any other agent for the production of light, heat, cold or power to or for public or a corporation for compensation, or
- the conveyance or transmission of information, messages or communications by guided or unguided electromagnetic waves, including systems of cable, microwave, optical fibre or radio or radio communications if that service is offered to the public for compensation.

Renewable Resources: Sources of energy which are inherently self-renewing, such as water power, solar energy, wind energy, tidal energy, and geothermal energy. Garbage and wastes burned as fuel are also considered renewable.

Tidal Power: Power produced by harnessing the natural rise and fall of the tide in an estuary or bay of the ocean.

Time-of-Use Pricing: Electricity rates differ by time of day, day of week and season. Prices are higher when the demand for energy is highest. Typical peak hours are during weekday mornings and evenings. During low demand hours – overnight and on weekends – prices are lower. Customers who will benefit most from this option are large energy users who can significantly shift their energy use from on-peak hours to mid- or off-peak hours.

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ACTS REFERENCED IN THE REPORT

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Social Services Tax Act

Utilities Commission Act

The Waste Management Act

Northern Pipeline Act